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GE-SPOKANE REMEDIAL DESIGN/REMEDIAL ACTION PROJECT

# PROJECT PLANS
# VOLUME 1

# SUMMARY CLEANUP ACTION PLANNING REPORT
# SOIL TREATMENT PLAN
# GROUND-WATER MONITORING PLAN
# INVESTIGATIVE AND PROJECT WASTE MANAGEMENT PLAN

Prepared for

GENERAL ELECTRIC COMPANY

by


BECHTEL ENVIRONMENTAL, INC.

San Francisco, California


December 1993


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## Section 1

## INTRODUCTION

This Summary Cleanup Action Planning Report was prepared for General Electric Company (GE) by Bechtel Environmental, Inc. (Bechtel) as one of the Project Plans for the GE-Spokane Remedial Design/Remedial Action (RD/RA) Project, as required under the *Consent Decree (WDOE, 1993b)* between GE and the Washington Department of Ecology (WDOE). The purpose of this report is to present an overview of the RD/RA project.

The remainder of Section 1 discusses the project background, objectives, and scope; describes the other RD/RA Project Plans; and describes the project organization. Section 2 describes the physical setting, the remedial investigation findings, and the extent of the materials to be treated. Section 3 provides a summary of the planned cleanup actions and supporting activities. Section 4 describes the schedule and deliverables for the project and Section 5 provides a list of references. Table 1-1 provides a cross-reference indicating where each of the Consent Decree requirements is addressed in this report.

### 1.1 Project Background

GE operated an apparatus service shop at East 4323 Mission Avenue in Spokane, Washington, during the period 1961 to 1980 (see Section 2 for more information regarding the service shop). Figure 1-1 shows the project site location and Figure 1-2 shows the site layout, including the former facilities, as existed in 1989. Existing site surface features are shown in Figure 1-3.

In 1985, polychlorinated biphenyls (PCBs) were detected in site soils. GE subsequently performed Phase 1, 2, and 3 investigations of PCBs and other constituents in soil and ground water. More information about these investigations is presented in *Bechtel, 1986a*; *Bechtel, 1986b*; *Bechtel, 1987*; and *Golder, 1988.*

In 1989, the site was placed on the National Priorities List (NPL), by the U. S. Environmental Protection Agency (U.S. EPA). Therefore, the site investigations and cleanup are subject to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the Superfund Amendments and Reauthorization Act (SARA). The site is also subject to the State of Washington Model Toxics Control Act (MTCA). The U.S. EPA designated Washington Department of Ecology (WDOE) as the lead regulatory agency for this site.

The area designated as the NPL site includes the GE property and adjacent properties owned by Washington Water Power and Mr. Marvin E. Riley, doing business as Federal Construction Company. Following the change to NPL status, GE entered into an Agreed Order with WDOE. Under the terms of the Agreed Order, GE subsequently performed a two-phase remedial investigation (Phase 4 for soils and other solid materials and Phase 5 for ground water) and a baseline risk assessment (see *Bechtel, 1991a; Everest, 1992;* and *Golder, 1992*).

The remedial investigations indicated that PCBs were present in surface soils, in sediments in sumps and other underground structures, and in soils beneath these structures, including the West Dry Well where steam cleaning effluent was discharged during operation of GE's service shop. Concentrations of PCBs were also detected in ground-water samples collected from wells downgradient of the West Dry Well. Petroleum hydrocarbons, metals and volatile organic compounds (VOCs) were also detected in some soil or ground-water samples. The extent of residual chemicals is described in more detail in Section 2.

During the Phase 4 Remedial Investigation, GE conducted some interim actions, including demolition of the site building and excavation of underground structures and associated soils. These activities are described in the reference *Bechtel, 1991a.*

Since about 1986, GE has been exploring the possible use of in situ vitrification (ISV) for treating the soils containing PCBs at the site. The ISV technology, which is a thermal treatment/immobilization process, is described further in Section 4 of the Soil Treatment Plan. In order to use this technology for treatment of PCB-containing soils at the GE-Spokane site, a Toxic Substances Control Act (TSCA) - required demonstration test must be performed so that the vendor of the technology, Geosafe Corporation (Geosafe), may obtain a TSCA permit for "disposal" of PCBs.

It was planned to conduct the ISV Demonstration Test at the GE-Spokane site in 1991. Shallow soils previously identified as PCB-containing were excavated and placed in five test cells along with soils spiked with imported PCBs and other materials removed during the interim actions described above. The preparations for the ISV Demonstration Test are described more completely in the reference *Bechtel, 1991b*. The planned demonstration test was delayed due to a mishap which occurred during an Operational Acceptance Test of the ISV equipment conducted by Geosafe at its Richland, Washington test site.

Under TSCA, a certificate of disposal must be provided within one year from the date when PCBs are "taken out of service" or removed from their original location. The PCB-spiked soils in one of the ISV test cells are subject to this requirement. The TSCA Section of U.S. EPA Region X was notified that, due to the delay in the planned ISV Demonstration Test, the spiked soils might remain in place for more than one year. U.S. EPA Region X granted an extension of the disposal certification requirement, with the provision that a plan and schedule for properly disposing of the materials "taken out of service" be submitted by October 1, 1993. A temporary cap was placed over the test cells in November 1991 to prevent infiltration of precipitation into the test cells and periodic site maintenance and inspections have been conducted since that time. The current schedule provided by Geosafe indicates the ISV Demonstration Test may be performed in early 1994.

After completion of the remedial investigations, GE conducted a feasibility study to evaluate remedial alternatives for soil and ground water (*Bechtel, 1992*). The feasibility study concluded that in situ vitrification would be the preferred cleanup action for soils, and institutional controls coupled with ground-water monitoring would be the preferred action for ground water. Contingent remedies were also identified in the feasibility study, for implementation in the event that ISV is not successfully demonstrated or ground-water monitoring and institutional controls are found to be ineffective. The contingent remedies are dechlorination for the soils; and extraction, treatment and discharge to a publicly-owned treatment works for the ground water.

In March 1993, WDOE issued a Cleanup Action Plan for the site *(WDOE, 1993a)*. The Cleanup Action Plan specifies PCBs and petroleum hydrocarbons as indicator chemicals for site cleanup and specifies the following cleanup levels:

| Medium | PCBs | Petroleum Hydrocarbons |
|---|---|---|
| Shallow Soils (≤ 15 ft deep) | 10 mg/kg | 200 mg/kg |
| Deep Soils (> 15 ft deep) | 60 mg/kg | 200 mg/kg |
| Ground Water | 0.1 μg/L | not applicable |

The Cleanup Action Plan specifies that the cleanup action for soils is treatment by vitrification and that the cleanup action for ground water is compliance monitoring and institutional controls; which are the preferred remedies identified in the feasibility study. The Cleanup Action Plan also specifies the same contingent remedies identified in the feasibility study. In-situ stabilization of some of the deep soils (grouting of soils below the West Dry Well from about 30 feet below ground surface to about 10 feet into the saturated zone) will also be performed because it is unlikely that the ISV technology will be sufficiently developed for treatment of soils at such depths.

The Consent Decree between GE and WDOE *(WDOE, 1993b)* outlines GE's responsibilities in performing the cleanup, including a specific scope and schedule of activities and deliverables. This document is a required deliverable under the Consent Decree.

### 1.2 Project Objectives and Scope

The overall objective of the project is to implement the remedies in the Cleanup Action Plan and the Consent Decree. Specific objectives are to:

- Monitor chemical concentrations in ground water;
- Prevent exposure to chemicals in ground water by restricting water well drilling and the use of ground water;
- Reduce chemical concentrations in soils to below the cleanup levels;

- Prevent migration of chemicals from deep soils; and
- Verify compliance and document the cleanup actions.

In order to meet these objectives, the project scope will consist of the following activities:

- Construct the ground-water monitoring network and perform periodic ground-water sampling and analysis;
- Implement institutional controls;
- Conduct the onsite ISV Demonstration Test and other treatability tests;
- Develop preliminary and final design for soil cleanup;
- Implement the soil cleanup action; and
- Perform compliance monitoring and document the soil cleanup action.

The interrelationships of each of these activities is shown in Figure 1-4. Each of these tasks is described in Section 3 and specific deliverables required under the Consent Decree are described in Section 4.

## 1.3 Related Remedial Design/Remedial Action Project Plans

This Summary Cleanup Action Planning Report is one of several Project Plans required under the Consent Decree. Although the individual Project Plans will be jointly submitted, they are intended to be stand-alone documents. The Project Plans required, in addition to this document, are listed below along with a brief description of the purpose and contents of each.

Institutional Control Plan

This document provides a plan for implementing institutional controls, which include deed restrictions and drilling restrictions, to minimize potential exposure to residual chemicals.

Ground-Water Monitoring Plan

This document describes the proposed monitoring program, including a plan for installing the new ground-water monitoring wells, collecting and analyzing ground-water samples, making field measurements, and periodic reporting of the data.

Soil Treatment Plan

This document provides a conceptual plan for the soil cleanup action, including treatment units and processes, maps depicting the extent of soils to be treated, and a schedule for the cleanup action.

Compliance Monitoring Plan

This document provides specific procedures for compliance monitoring, which includes ground-water compliance monitoring, soil cleanup compliance sampling, soil-gas sampling, and air sampling. The compliance monitoring plan consists of:

1) Ground-Water Sampling and Analysis Plan;
2) Soil Sampling and Analysis Plan;
3) Soil-Gas Sampling and Analysis Plan; and
4) Quality Assurance Project Plan.

The Air Sampling and Analysis Plan required under the Consent Decree is presented in the Health and Safety Plan, discussed below.

Data Management Plan

This document provides procedures for managing analytical data and for evaluating the data to demonstrate compliance.

Investigative and Project Waste Management Plan

This document provides procedures for the proper management of wastes generated in the course of site investigation and cleanup.

Health and Safety Plan

This document provides policies and detailed procedures for the protection of the health and safety of site workers during the RD/RA activities. As mentioned above, this plan will include the Air Sampling and Analysis Plan.

Public Participation Plan

This document outlines procedures for providing the public with timely information and an opportunity to participate in accordance with *Washington Administrative Code (WAC) 173-340-600 (WDOE, 1990)*. The Public Participation Plan has been prepared by WDOE.

Specific requirements for the contents of these documents are outlined in the Consent Decree. Because the organization of each document may differ slightly from that shown in the Consent Decree, a cross-reference, showing the location of each required element, is provided in each document.

## 1.4 Project Organization

The organization of the RD/RA project is shown in Figure 1-5. The responsibilities of each of the key technical personnel are discussed below.

Project Manager

The Project Manager reports directly to GE's Manager of Remedial Projects. The Project Manager will be responsible for overall project execution and quality, including scoping, staffing, scheduling, budgeting, preparation of project policies and procedures, technical review, and client communications.

Project QA Manager

The QA Manager reports directly to the Project Manager. The QA Manager will review, monitor, audit, and evaluate the performance of work for adherence to project procedures. The QA Manager will be responsible for identifying problems that may arise in the quality of the work and will recommend corrective actions.

Health and Safety Manager

The Health and Safety Manager reports directly to the Project Manager. The responsibilities of the Health and Safety Manager are to ensure compliance of the project health and safety procedures with regulatory and Bechtel corporate health and safety guidelines, policies and procedures.

Project Engineer

The Project Engineer reports directly to the Project Manager. The Project Engineer's responsibilities includes supervising preliminary and final design, coordinating design efforts among the various engineering disciplines, and preparing the design reports.

Project Scientist

The Project Scientist reports directly to the Project Manager. The responsibility of the Project Scientist is to ensure the technical quality of the geotechnical and environmental science aspects of the work, including sampling and analysis for treatability testing, verification and monitoring; preparing the Project Plans and the completion reports; and for technical review of the design documents and other project documents.

Site Construction Manager

The Site Construction Manager reports to the Project Manager. The Site Construction Manager has overall responsibility for all field construction activities and for ensuring that all work is carried out according to the plans and specifications.

# Section 2

# SITE DESCRIPTION AND MATERIALS TO BE TREATED

This section provides a description of the physical setting of the site, the former site facilities, the remedial investigation findings, and the materials to be treated.

## 2.1 Site Description

Site ownership boundaries and former facilities are shown on Figure 1-2, and the existing site features are shown in Figure 1-3.

### 2.1.1 Former Facilities

The former GE apparatus service shop was demolished as part of the interim actions performed in 1990. The building occupied approximately 11,000 square feet and was located on the GE-owned portion of the site (see Figure 1-2). Several underground structures (tanks, pits, sumps and dry wells), which were formerly used to collect, store or discharge fluids related to equipment servicing operations, were located either within or outside of the service shop as shown on Figure 1-2. All of these structures, except the West Dry Well and the Unknown Sump, were removed during the Phase 4 Remedial Investigation.

### 2.1.2 Surface Features

The GE-Spokane site is located in a light industrial sector of east Spokane. It is situated on a level terrace approximately 1,200 feet south of the Spokane River. The site is at an elevation of approximately 1,960 feet above mean sea level, which is approximately 90 feet above the elevation of the Spokane River. The site is located in the City of Spokane zone "C"; which is outside the limits of the 500-year flood zone.

The GE-owned portion of the site is relatively flat and is graded with a surface cover of clean soil, cobble, crushed rock, and sand. The only man-made surface features remaining on the GE and Washington Water Power portions of the site are the asphalt access road to Mr. Riley's property, the wellheads of the monitoring wells, and power transmission lines. Facilities on Mr. Riley's property consist of the North Warehouse and several other small structures. Subsurface features include the ISV test cells, which are described in Section 2.2 of the Soil Treatment Plan. The entire site is surrounded by a chain-link fence with locking gates.

### 2.1.3 Geologic Setting

The site is located in the Spokane River Valley, which extends from Lake Coeur D'Alene in western Idaho into eastern Washington. The uppermost geologic unit in the Spokane River Valley is a thick deposit of unconsolidated sediments known as the Spokane Valley-Rathdrum Prairie Aquifer *(Drost and Seitz, 1978)*. The aquifer is underlain by low permeability bedrock at an estimated depth of 400 feet *(Bolke and Vaccaro, 1981)*.

The Spokane Valley-Rathdrum Prairie deposits are predominantly comprised of poorly to moderately sorted gravel and sand. The gravel deposits are often very coarse, ranging from pebble- to boulder-size, with minor clay and silt lenses in some areas.

### 2.1.4 Stratigraphy

The site stratigraphy was investigated through the sampling of the subsurface borings and shallow pits during the remedial investigations described in Section 1. The site is underlain by the Spokane Valley-Rathdrum Prairie gravel deposits as described above, to at least 120 feet, the approximate maximum depth of exploration at the site.

The stratigraphy in the West Dry Well area, which is typical of the site in general, is illustrated by the geologic sections on Figures 2-1, 2-2 and 2-3. A key to the sections is provided in Figure 2-4. The subsurface soils are dominated by poorly to moderately well-graded sandy gravel. Several silty gravel layers and thin sand layers, which generally cannot be correlated, were encountered to the south and southwest of the West Dry Well. Several of the sand lenses contain significant amounts of silt, but little clay or organic matter.

### 2.1.5 Ground Water

The regional characteristics and water quality of the Spokane Valley - Rathdrum Prairie Aquifer have been investigated by several agencies, as summarized in *Bechtel, 1992*. The aquifer is unconfined and its lateral hydraulic conductivity is estimated to be 0.02 to 0.04 ft/sec (0.61 to 1.22 cm/sec) in the site area, based on a flow model developed by the U. S. Geological Survey (USGS) *(Vaccaro and Bolke, 1983)*. The model also indicates that ground-water flow velocities range from less than 1 ft/day to greater than 50 ft/day in the vicinity of the site. The aquifer reportedly has specific yield values of 0.1 to 0.3 *(Bolke and Vaccaro, 1981)*. The USGS flow model *(Vaccaro and Bolke, 1983)* shows both gaining and losing sections along the Spokane River, with the section of the Spokane River nearest the site shown as a gaining reach. Regional water levels in the aquifer fluctuate seasonally (up to 15 feet per year), primarily in response to infiltration from precipitation and to changes in the river level.

Measurement of water levels in onsite and offsite ground-water monitoring wells indicate the water table occurs at a depth of approximately 65 to 70 feet, and 30 feet below ground surface, respectively. Seasonal water-table fluctuations in the monitoring wells are on the order of five feet, with the highest water-table elevations in the spring and the lowest in the fall. Ground-water flow beneath the site is to the northwest with a horizontal gradient of about 0.0017 ft/ft. Based on the differences in water levels measured in wells screened at different elevations, no consistent vertical gradient is apparent. Ground-water levels measured in January-February 1993 are shown on Figure 2-5.

## 2.2 Summary of Remedial Investigation Findings

This section summarizes the findings of the five phases of remedial investigation performed by GE. Shallow soils, deep soils and ground water are discussed separately. The previous excavations associated with the interim actions and ISV test cell preparation resulted in removal of some of the chemical-containing soils detected in the remedial investigations. The extent and estimated volumes of the materials remaining onsite following these excavations are discussed in Section 2.3.

Chemicals detected in the shallow soils (less than or equal to 15 feet below ground surface) included: PCBs, volatile organic compounds, chlorinated benzenes, metals and total petroleum hydrocarbons (TPH). Of these groups of compounds, PCBs were detected most frequently and in the highest concentrations. PCBs were found to occur in both non-localized areas to the west, north and south of the former service shop, and in areas specifically associated with the underground structures. The other chemicals detected were spatially associated with the PCBs, but generally occurred in much lower concentrations. VOCs and metals were found to occur only in soils associated with the underground structures.

Chemicals above cleanup levels in deep soils (greater than 15 feet below ground surface) were found to occur in only two areas: the West Dry Well area and the former Transformer Oil Storage Tank area. These soils contained PCBs and, in the West Dry Well area, TPH, and chlorinated benzenes. In the West Dry Well area soils, PCBs and TPH were found to extend to the ground-water table. In the former Transformer Oil Storage Tank area, PCBs were found to extend to at least 16 feet. Metals and VOCs were not found to occur at concentrations of concern in deep soils.

The chemicals detected in ground water include PCBs, lead, zinc, 1,2,3,5-tetrachlorobenzene, certain volatile organic compounds, and phthalates. However, PCBs are the only chemicals detected at concentrations of concern.

The suspected source of the PCBs in ground water is the deep PCB-containing soil in the West Dry Well area. PCBs have been detected consistently at concentrations of approximately 1 to 8 $\mu g/L$ in wells MW5 and MW8, which are immediately downgradient of the West Dry Well. The distribution of PCBs in ground water extends to around well MW11, near the downgradient GE property boundary. Samples from this well have intermittently had concentrations of PCBs around 0.5 µg/L. The occurrence of the other chemicals in ground water is described in more detail in Section 1.5 of the Ground-Water Monitoring Plan.

### 2.3 Materials to be Treated

This section describes the lateral and vertical extent of materials to be treated. As previously mentioned, the identification of areas to be treated takes into account the previous excavations which removed some of the chemical-containing soils detected in the remedial investigations. These excavations, which took place during the interim actions and ISV test cell preparations, are briefly described below and are described in more detail in Section 2 of the Soil Treatment Plan.

During the interim actions, most of the underground structures (except for the West Dry Well and the Unknown Sump) and associated soils were removed to facilitate access for sampling. This effectively eliminated most concentrations of VOCs and metals in shallow soils, as these compounds generally occurred in soils associated with the underground structures.

During the ISV Demonstration Test preparations, an area thought to be clean was excavated for the ISV test cells. The excavated soils were mechanically screened to reduce the volume of the material by removing the particles greater than 1 inch in size. The resulting materials less than 1 inch in size, hereinafter referred to as the volume reduction fines, were used as deep backfill around the ISV test cells (to 21 feet) and shallow fill (to 6 inches) in other parts of the site. When later tested, some samples of the volume reduction fines used as shallow fill contained PCB concentrations greater than 10 mg/kg. The portion used as backfill around the ISV test cells has not been sampled and analyzed, but this material is tentatively included in the volume estimates as requiring treatment.

Also during the ISV Demonstration Test preparations, an area of PCB-containing soil was excavated to provide backfill for the ISV test cells. This resulted in the removal of much, but not all, of the PCB-containing soil in the non-localized areas to the north, west and south of the former service shop.

In the discussion below, the materials to be treated are grouped by location and/or depth. The West Dry Well area, which has both shallow and deep chemical-containing soils, is discussed separately, then the remaining areas are discussed. The areas of soil to be treated are shown in Figures 2-6 and 2-7. The quantities of soils in each area summarized in Table 2-1. It should be noted that the estimated volume of soil to be treated does not represent the total volume of soil that will need to be handled during cleanup, as several feet of clean backfill overlie the chemical-containing soil in some areas.

### 2.3.1 West Dry Well Area Soils

Figure 2-4 shows the locations of several profiles through the West Dry Well area. The PCBs in the West Dry Well area soils extend to the ground-water table at a depth of approximately 65 feet below ground surface as shown in Figure 2-8. The extent of the PCBs narrows with depth. At the ground surface, the approximate lateral extent of PCB-containing soils may be represented by an approximately elliptical area 30 feet in diameter.

The distribution of TPH-containing soils in the West Dry Well area roughly coincides with that of PCBs, with perhaps a somewhat larger areal extent at the ground surface but narrower at depth. TPH does not extend to the ground-water table, as indicated in Figure 2-9.

Approximately 144 cubic yards of shallow soil (less than or equal to 15 feet deep) and 211 cubic yards of deep soil (15 to 65 feet deep) in the West Dry Well area will need to be treated.

### 2.3.2 Other Soils

Six localized areas associated with underground structures contain remaining shallow soils with PCBs above cleanup levels (see Figure 2-6). These are: Sump S1, North Sump, Unknown Sump, Small Transformer Oil Storage Tank, Large

Transformer Oil Storage Tank, and the West Dry Well (extent and volume discussed above). TPH above the cleanup level is known to be present only in sludge in the Unknown Sump, although it may also be present in soils which were not previously tested for TPH.

In addition to the above localized areas, there are seven numbered (see Table 2-1 and Figure 2-6) subsurface areas where PCBs above the cleanup level remain after excavating soils for placement in the ISV test cells. Sample analytical results from the bottoms and walls in these previously excavated areas form the basis for estimating the depths and volumes of chemical-containing soils. The seven subsurface areas contain a total of approximately 2,015 cubic yards of shallow soil above the cleanup levels.

Shallow soils to be treated include approximately 446 cubic yards of volume reduction fines used as shallow fill in three areas of the site (see Figure 2-7). Approximately 2,550 cubic yards of the volume reduction fines (the portion equal to or above 15 feet deep) used as backfill around the ISV test cells may also require treatment. These soils were not previously tested, so sampling and analysis is planned to determine whether treatment will be required.

The former Large Transformer Oil Storage Tank area, located adjacent to the West Dry Well, is the only area, besides the West Dry Well area, containing chemicals above the cleanup levels in deep soils. This area is believed to contain approximately 111 cubic yards of deep soil with PCB concentrations above the cleanup level, based on the results of samples collected in this area during the Phase 4 Remedial Investigation and estimates of the area and thickness of soil that will require treatment.

The deep portion of the volume reduction fines (from 15 to 21 feet deep) used as backfill around the ISV test cells represents about 300 cubic yards. This material will require treatment if it is found to contain indicator chemicals above the cleanup levels.

### 2.3.3 Ground Water

Ground water requiring cleanup occurs in a narrow zone extending downgradient from the West Dry Well area, to approximately the location of well MW11. A summary of PCB concentrations detected in ground water is provided in Table 2-2 and the generalized distribution of PCBs in ground water is shown on Figure 2-10.

## Section 3

# SUMMARY OF PLANNED CLEANUP ACTIONS AND SUPPORTING ACTIVITIES

This section provides the cleanup goals and performance requirements and a summary of the planned RD/RA activities, including the cleanup actions and supporting activities such as the ISV Demonstration Test.

### 3.1 Cleanup Goals and Performance Requirements

The cleanup goals for the project are to reduce the concentrations of chemicals in site soils and ground-water to below the cleanup levels specified in the Cleanup Action Plan, which are given in Section 1.1. WDOE has provided cleanup levels for PCBs and TPH only, because they are the chemicals of greatest concern. However, the other chemicals present in site soils, which generally occur at lower concentrations, will also be remediated as their distributions closely correlate with those of the PCBs and TPH, and the cleanup technologies selected are effective for all of the chemicals.

Chemicals in soil will be treated directly by vitrification or immobilized by grouting. By this elimination of chemical sources in soil, and the natural process of dispersion, ground-water PCB concentrations are expected to be reduced to below the cleanup level over time. However, it is uncertain exactly how much time will be required to achieve this. Ground-water monitoring will be implemented to track the changes in concentrations for a period of five years, at which time WDOE will conduct a review of the monitoring program. Institutional controls will also be implemented to prevent human exposure to concentrations of chemicals during and beyond the monitoring period.

Performance requirements for the cleanup action are to:

- Excavate all soils previously identified as containing chemical concentrations above cleanup levels (except for soils below 30 feet deep in the West Dry Well area, which will be grouted).

- Reduce, by vitrification, the chemical concentrations in the excavated soils to below the cleanup levels.

- Encapsulate the chemical-containing soils in the West Dry Well area below 30 feet using grouting so that the chemicals cannot leach to ground water.

- Effect institutional controls such that potential exposure to residual chemicals is minimized.

- Demonstrate that cleanup levels have been achieved to an acceptable level of uncertainty.

- Conduct all cleanup activities, including vendor treatment processes, in a manner which is protective of the environment and the health and safety of site workers and the general public.

## 3.2 Ground-Water Compliance Monitoring

The ground-water compliance monitoring program will involve quarterly sampling of the monitoring network wells. The monitoring will include measurement of water levels and collection of samples for analysis of PCBs and other constituents as described in Section 2.2 of the Ground-Water Monitoring Plan. These data will provide a measure of the change in chemical concentrations over time, as well as the hydraulic conditions which may affect them. The ground-water monitoring will also provide early warning of changes in the migration of chemicals, if any.

Ground-water monitoring activities and results will be reported quarterly and annually to WDOE.

## 3.3 Institutional Controls

As previously mentioned, the concentrations of chemicals in ground water are expected to gradually diminish over time through natural processes after treatment of chemical sources in soil. In order to reduce the risk of exposure to ground water while this is achieved, institutional controls including drilling and ground-water use restrictions and deed restrictions will be implemented. Use restrictions will involve prohibitions on drilling water supply wells onsite or immediately downgradient of the site as long as ground-water monitoring shows concentrations of chemicals above the cleanup levels. In addition, specific uses of water extracted from site wells which could result in human exposures will be prohibited.

The first restriction will be effected by filing a notice with WDOE, which issues permits for water well construction in the State of Washington. The latter restriction will be effected by incorporation in the deed restriction. The deed restriction will involve placing a restrictive covenant on the deeds of the affected properties. The deed restriction will be both informational in nature, describing the ground-water conditions, and restrictive, prohibiting installation of drinking water wells and specific uses of site ground water.

## 3.4 In Situ Vitrification Demonstration Test

As mentioned in Section 1, GE is planning to conduct a demonstration test of Geosafe's in situ vitrification technology at the Spokane site as a treatability test for remedial design. The ISV Demonstration Test is described in detail in Section 5 the Soil Treatment Plan, and is summarized below.

The ISV technology is a thermal treatment/immobilization process whereby electrical heating melts the chemical-containing soil, resulting in a chemically inert and stable glass and crystalline product. The organic chemicals in the soil are vaporized and pyrolyzed into elementary gaseous components and the inorganic components are fixed (immobilized) in the melted soil. A schematic of the ISV process is provided in Figure 3-1.

The ISV Demonstration Test at the GE-Spokane site will consist of processing five previously constructed subsurface treatment cells filled with PCB-containing materials. The ISV test cell configuration is shown in plan view and cross-section in Figures 3-2 and 3-3, respectively. The ISV preparation activities were reported in detail in the *Report of In Situ Vitrification Demonstration Test Preparation Activities (Bechtel, 1991b)* and are summarized in Section 2.2 of the Soil Treatment Plan.

Modifications of the test cells, such as puncturing the drums in the cells and rupturing the concrete walls, will be needed before conducting the demonstration test to conform with Geosafe's new requirements resulting from evaluation of the previous operational acceptance tests. The planned modifications are described in Section 5 of the Soil Treatment Plan.

Monitoring for soil-gas pressure changes during the ISV Demonstration Test, which is intended to detect outward migration of gases from the melt, is required by WDOE. The proposed soil-gas monitoring program is described in the Soil-Gas Sampling and Analysis Plan, Part 3 of the Compliance Monitoring Plan.

## 3.5 Soil Cleanup Action

In general, the soil cleanup action will consist of excavation, mechanical screening, staging, and vitrification of the majority of site soils and in-situ stabilization (grouting) of the West Dry Well soils below a depth of about 30 feet.

The conceptual site layout for the excavation is provided in Figure 3-4. Excavation of the soils above cleanup levels will proceed in stages. The floors of the excavations will be sampled and analyzed as the work progresses to determine if cleanup levels have been met. Clean soil and soil containing chemicals will be segregated and stockpiled separately.

Excavated soil containing chemicals will be mechanically screened to separate the material greater than 1-inch in size. This "cobble" will be analyzed to verify that it does not contain chemicals above the cleanup level. If some of the cobble is found to contain chemicals in excess of the cleanup levels, it will either be vitrified or subjected to a washing process to reduce the concentrations of chemicals. The fine, chemical-containing portion of the soil will be vitrified. A conceptual site layout for vitrification is shown in Figure 3-5.

The grouting of soils below a depth of 30 feet in the West Dry Well area will involve placing a cylindrical barrier of interlocking grouted soil columns around the sides and base of the chemical-containing soils. The result will be a stabilized mass of chemical-containing soil surrounded by a low-permeability barrier. This barrier will prevent leaching of chemicals from the soil to the ground water. A schematic of the grouting concept is shown in Figure 3-6. In order to design the grouting program, treatability tests will be conducted as part of the soil cleanup action design process. The treatability tests will include geotechnical testing to characterize the soils, and a field pilot test to demonstrate the effectiveness of the technology.

A total of approximately 6,500 cubic yards of soils will require cleanup. Assuming 6,500 yards are excavated (the volume to be grouted is small), and a volume reduction of 25 percent is achieved by screening, approximately 4,900 cubic yards of soil will be vitrified. Since vitrification decreases the soil volume by 20 to 40 percent, approximately 2,000 cubic yards of clean fill will need to be imported to the site to restore the natural grade.

## 3.6 Cleanup Compliance Monitoring and Documentation

Ground-water cleanup, effected through removal of source chemicals and through natural processes, will be verified through the ground-water monitoring program described in the Ground-Water Monitoring Plan. Soil cleanup will be verified through the soil compliance sampling program described in the Soil Sampling and Analysis Plan. The sample results for soil and ground water will be evaluated to demonstrate compliance according to the procedures in the Data Management Plan. The cleanup activities and results of the compliance sampling evaluation will be presented in the Cleanup Action Report.

## Section 4

## SCHEDULE AND DELIVERABLES

The discussion below provides the project schedule and identifies primary deliverables, which are required for submittal to WDOE under the Consent Decree. The primary deliverables, and the secondary deliverables (which are not required submittals under the Consent Decree), are summarized on Figure 1-4.

### 4.1 Project Schedule

The project schedule, showing each of the tasks described in Section 3, is provided in Figure 4-1. The project schedule will be updated as the project proceeds, however the primary milestones, which are set forth in the Consent Decree, are fixed. Some of these are "estimated" milestones because they will depend on the length of the WDOE review period, and some are fixed calendar dates. The baseline date for the RD/RA project is October 4, 1993, the day of closure of the public review period for the Consent Decree. It should be noted that the ground-water compliance monitoring program and the soil cleanup action are on independent timelines, because of the higher level of complexity of the soil cleanup design and the need for treatability tests.

### 4.2 Monthly Progress Reports

Bechtel shall prepare, and following GE review, submit to WDOE monthly progress reports. The progress reports shall include a list of onsite activities that have taken place during the month; a description of any deviations from required tasks or the schedule; a plan for recovering lost time, if needed; copies of all relevant data; and a list of deliverables for the upcoming month. A list of the data to be included in the monthly progress reports is provided in Section 7.5.4 of the Quality Assurance Project Plan. Progress reports are due to WDOE by the tenth of each month.

## 4.3 Ground-Water Compliance Monitoring Reports

Ground-Water Monitoring Compliance Reports must be submitted to WDOE on a quarterly and annual basis (fourth quarter results may be incorporated into the annual report). A description of the anticipated contents of the reports is provided in Section 4 of the Ground Water Monitoring Plan. After five years, a review of the monitoring program will be conducted by WDOE.

## 4.4 Preliminary Soil Treatment Design, Construction and Operation Plan

The Preliminary Soil Treatment Design, Construction, and Operation Plan will be a 30 percent (or higher) design level document. The plan will include refined areas, depths, and volumes of soils to be treated and will incorporate the results of additional sampling and the treatability tests. A more detailed description of the required elements for the plan is provided in Section 5.3 of the Soil Treatment Plan.

## 4.5 Final Soil Treatment Design, Construction and Operation Plan

The Final Soil Treatment Design, Construction and Operation Plan will provide a complete (100 percent) design for the soil cleanup action and will contain sufficient information to meet the requirements listed in *WAC 173-340-400 (Cleanup Actions) (WDOE, 1990)*. It will incorporate WDOE comments on the Preliminary Soil Treatment Design, Construction and Operation Plan. Specific required elements of the Final Soil Treatment Design, Construction and Operation Plan are listed in Section 5.4 of the Soil Treatment Plan.

## 4.6 Cleanup Action Report

The Cleanup Action Report will document the cleanup action and compliance sampling results. The required contents of this report are described in Section 6.5 the Soil Treatment Plan.

## Section 5

## REFERENCES


Bechtel National, Inc., 1986a, *Phase 1 Field Investigation, East 4323 Mission Avenue, Spokane, Washington*: Report to General Electric Company.

Bechtel National, Inc., 1986b, *Field Investigation Report, North Warehouse, Spokane, Washington*: Report to General Electric Company.

Bechtel National, Inc., 1987, *Phase 2 Field Investigation, East 4323 Mission Avenue, Spokane, Washington*: Report to General Electric Company.

Bechtel Environmental, Inc., 1991a, *Report of Phase 4 Remedial Investigation and Interim Actions at the former General Electric Spokane Facility:* Report to General Electric Company.

Bechtel Environmental, Inc., 1991b, *Report of In Situ Vitrification Demonstration Test Preparation Activities at the former General Electric Spokane Facility:* Report to General Electric Company.

Bechtel Environmental, Inc., 1992, *Feasibility Study Report for the former General Electric Facility, Spokane Washington:* Report to General Electric Company.

Bolke, E.L. and Vaccaro, J.J., 1981, *Digital-Model Simulation of the Hydrologic Flow System, with Emphasis on Ground Water, in the Spokane Valley, Washington and Idaho:* U.S. Geological Survey Open-File Report 80-1300, Tacoma, WA.

Drost, B.W. and Seitz, H.R., 1978, *Spokane Valley-Rathdrum Prairie Aquifer, Washington and Idaho:* U.S. Geological Survey Open-File Report 77-829, Tacoma, WA.

Everest Consulting Associates, 1992, *Baseline Risk Assessment: Mission Avenue Site:* Report to General Electric Company.

Golder Associates, Inc., 1988, *Phase 3 Remedial Investigation, East 4323 Mission Avenue, Spokane, Washington*: Report to General Electric Company.

Golder Associates, Inc., 1992, *Phase 5 Remedial Investigation Report, East 4323 Mission Avenue, Spokane, Washington:* Report to General Electric Company.

Vaccaro, J.J., and Bolke, E.L., 1983, *Evaluation of Water-Quality Characteristics of Part of the Spokane Aquifer, Washington and Idaho, Using a Solute-Transport Model*: U.S. Geological Survey Open File Report 81-769, Tacoma, WA.

Washington Department of Ecology, 1990, *The Model Toxics Control Act Cleanup Regulation and Proposed Amendments:* Chapter 173-340, Washington Administrative Code (July 27, 1990).

Washington Department of Ecology, 1993a, *Final Cleanup Action Plan for the General Electric Spokane Site,* March 29, 1993.

Washington Department of Ecology, 1993b, *GE/Spokane Consent Decree,* August 25, 1993.

TABLES

# TABLES

**TABLE 1-1**

**CROSS-REFERENCE TO CONSENT DECREE REQUIREMENTS**

| *Consent Decree Requirement* | *Section* |
|---|---|
| Goals of the cleanup action and performance requirements. | 3.1 |
| General information on the facility, and a summary of RI/FS documents, updated to reflect current conditions. | 2 |
| Identification of site owners, principal persons and responsibilities. | 1.1 |
| Facility maps, showing current conditions and location of the cleanup action. | 2, 3 |
| Characteristics, location, and quantity of material to be treated. | 2, 3 |
| Schedule of deliverables. | 4 |

## TABLE 2-1

## SUMMARY OF SOIL VOLUMES, DEPTHS AND PCB CONCENTRATIONS[a]

| *SITE AREA* | *ESTIMATED VERTICAL EXTENT (ft)* | *MAXIMUM PCB CONCENTRATION[b] (mg/kg)* | *ESTIMATED TREATMENT/ EXCAVATION VOLUME (cubic yards)* |
|---|---|---|---|
| Shallow Soils | | | |
| West Dry Well | 5-15 | 180 | 144 |
| Sump S1 | 3-10 | 250 | 84 |
| North Sump | 0-10 | 17 | 19 |
| Unknown Sump | 0-10 | >150 | 278 |
| Small TOST | 5-13 | 211 | 119 |
| Large TOST | 5-15 | 120 | 185 |
| Subsurface Area 1 | 1-4 | 420 | 964 |
| Subsurface Area 2 | 1-4 | 95 | 132 |
| Subsurface Area 3 | 5-10 | >140[c] | 116 |
| Subsurface Area 4 | 6-9 | 29 | 25 |
| Subsurface Area 5 | 2-5 | 93[c] | 167 |
| Subsurface Area 6 | 1-7 | 890 | 567 |
| Subsurface Area 7 | 3-6 | 63 | 44 |
| Reduction Fines | 0-0.5 | 56 | 446 |
| ISV Slope Backfill | 0-15 | (d) | 2550 |
| *Subtotal* | | | *5840* |

TABLE 2-1 (Cont'd)

SUMMARY OF SOIL VOLUMES, DEPTHS AND PCB CONCENTRATIONS[a]

| *SITE AREA* | *ESTIMATED VERTICAL EXTENT (ft)* | *MAXIMUM PCB CONCENTRATION[b] (mg/kg)* | *ESTIMATED TREATMENT/ EXCAVATION VOLUME (cubic yards)* |
|---|---|---|---|
| Deep Soils | | | |
| West Dry Well | 15-55[e] | 21,000 | 211 |
| Large TOST | 15-21 | 120 | 111 |
| ISV Slope Backfill | 15-21 | (d) | 300 |
| *Subtotal* | | | *622* |
| ***Grand Total*** | | | ***6462*** |

(a) Estimated volumes and vertical extents will be refined in the soil cleanup design. The information provided here is from the conceptual estimate in the *Feasibility Study Report (Bechtel, 1992).*
(b) Sum of Aroclors 1254 and 1260.
(c) Onsite analytical laboratory data.
(d) Concentration uncertain - not analyzed in-situ.
(e) The actual depth anticipated to be treated is 65 feet.

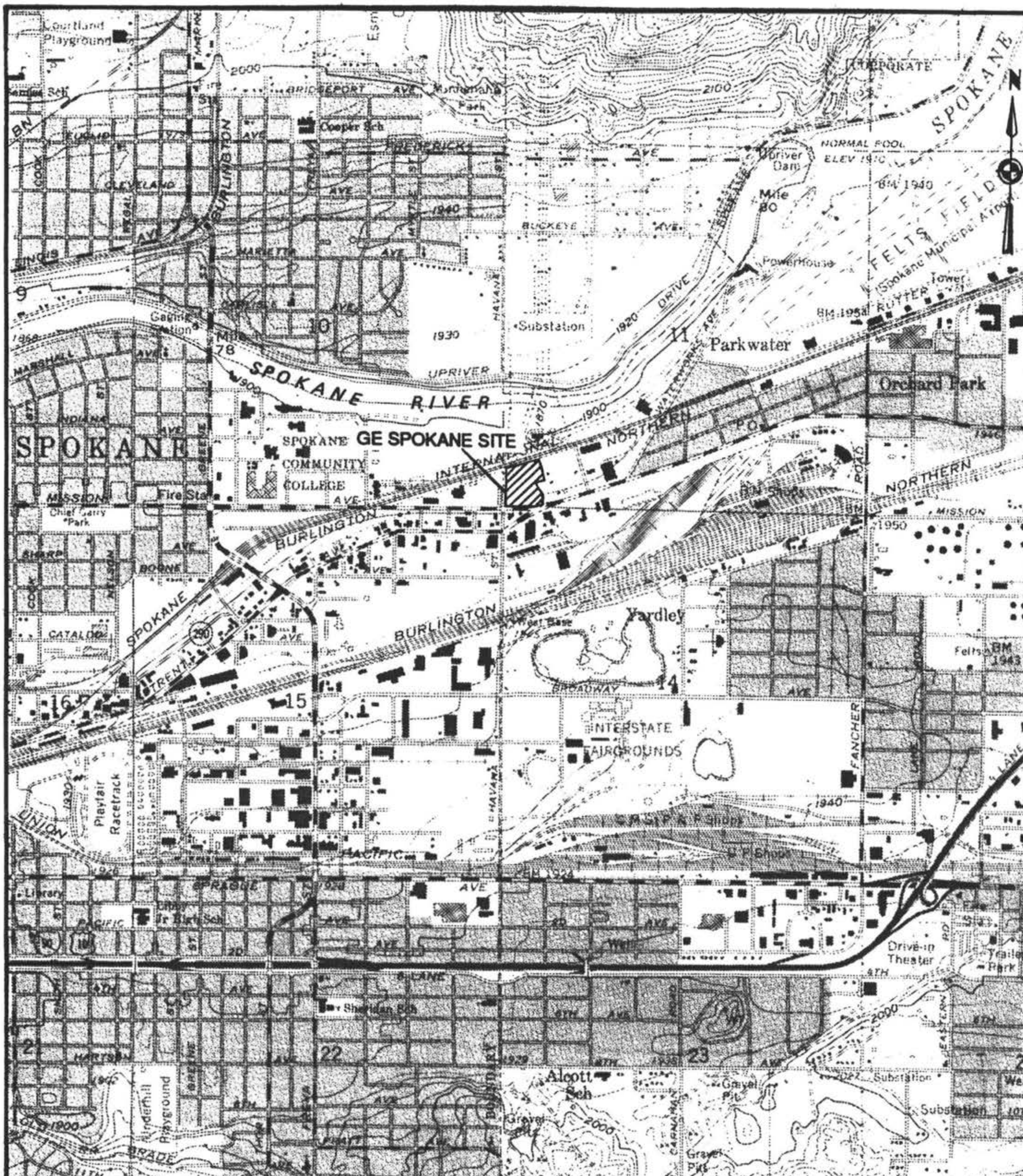
## TABLE 2-2

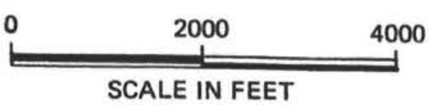
## SUMMARY OF PCB CONCENTRATIONS IN GROUND WATER
(Aroclor 1260 in ug/L)

| *Well No.* | *Nov-86* | *Jan-88* | *Oct-90* | *Jan-91* | *Mar-91* | *Aug-91* | *Jan-92* | *Jul-92* | *Jan-93* |
|---|---|---|---|---|---|---|---|---|---|
| **MW-1** | <0.5 | <0.1 | <0.5 | <0.51 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| **MW-2** | <0.5 | <0.1 | <0.5 | <0.51 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| **MW-3** | <0.5 | <0.1 | <0.5 | <0.51 | >0.52 | <0.5 | <0.5 | <0.5 | <0.5 |
| **MW-4** | <0.5 | <0.1 | <0.5 | <0.52 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| **MW-5** | **2.6** | **3.6** | **2.7** | **2.3** | **4.3** | **3.8** | **3.6** | **3.7** | **2.3** |
| **MW-6** | NA | <0.5 | <0.5 | <0.52 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| **MW-7** | NA | <0.1 | <0.5 | <0.52 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| **MW-8** | NA | **1.1** | **150** | **7.7** | **4.8** | **3.5** | **3.6** | **2.8** | **2.9** |
| **MW-9U** | NA | <0.5 | <0.5 | <0.52 | <0.48 | <0.5 | <0.5 | <0.5 | <0.5 |
| **MW-9L** | NA | <0.1 | <0.5 | <0.52 | >0.52 | <0.5 | <0.5 | <0.5 | <0.5 |
| **MW-10** | NA | <0.1 | <0.5 | <0.52 | <0.49 | <0.5 | <0.5 | <0.5 | <0.5 |
| **MW-11** | NA | **0.71** | <0.5 | <0.52 | **0.89** | <0.52 | <0.5 | **0.38** | <0.5 |
| **MW-12** | NA | NA | <0.5 | <0.52 | <0.56 | <0.52 | <0.5 | <0.5 | <0.5 |
| **MW-13** | NA | NA | <0.5 | <0.53 | <0.48 | <0.5 | <0.5 | <0.5 | <0.5 |
| **MW-14** | NA | NA | <0.5 | <0.52 | <0.49 | <0.5 | <0.5 | <0.5 | <0.5 |
| **MW-15** | NA | NA | <0.5 | <0.52 | <0.49 | <0.5 | <0.5 | <0.5 | <0.5 |
| **MW-16** | NA | NA | <0.5 | <0.52 | <0.49 | <0.5 | <0.5 | <0.5 | <0.5 |
| **MW-17** | NA | NA | <0.5 | <0.53 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |

FIGURES

FIGURES

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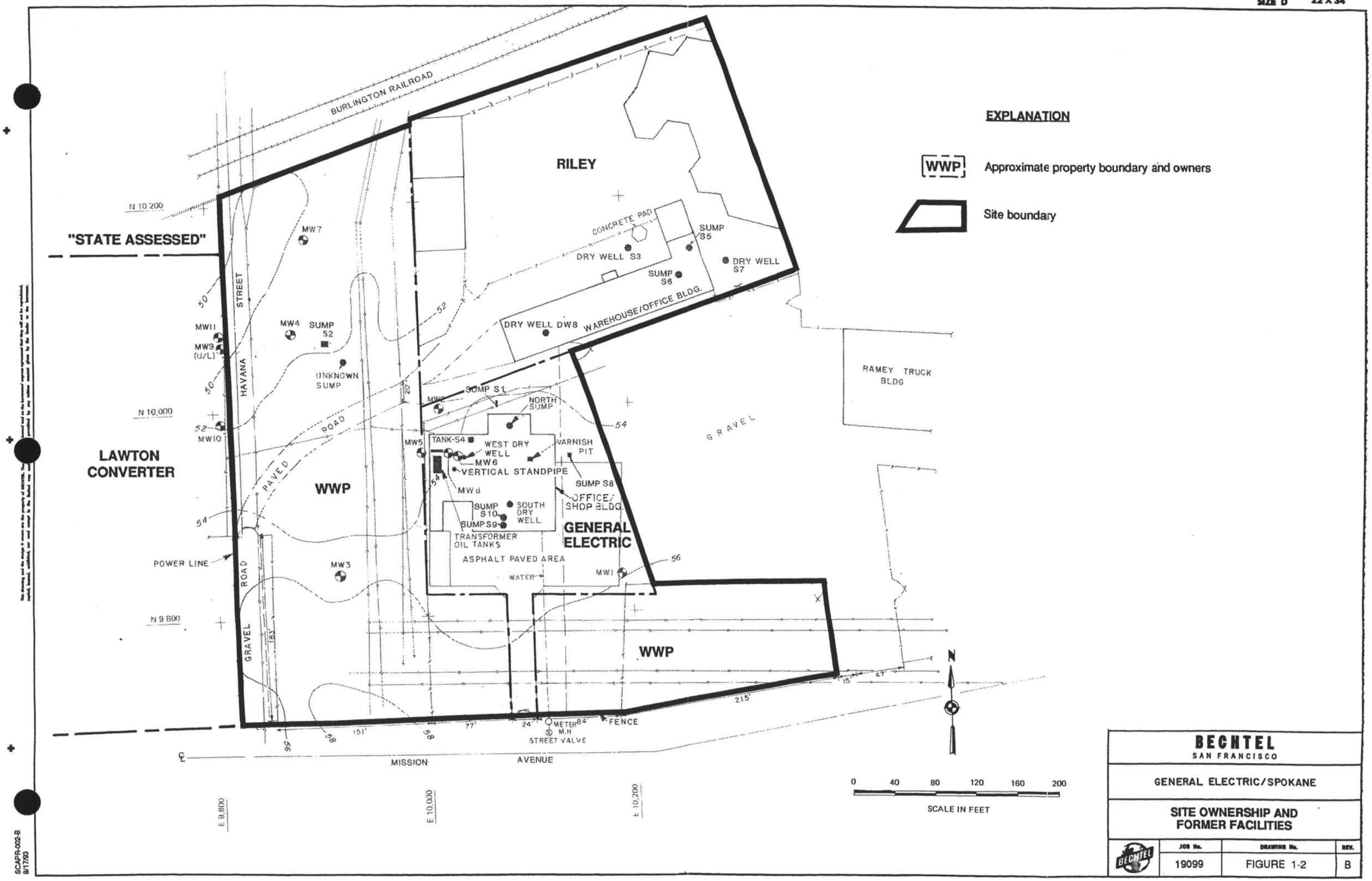
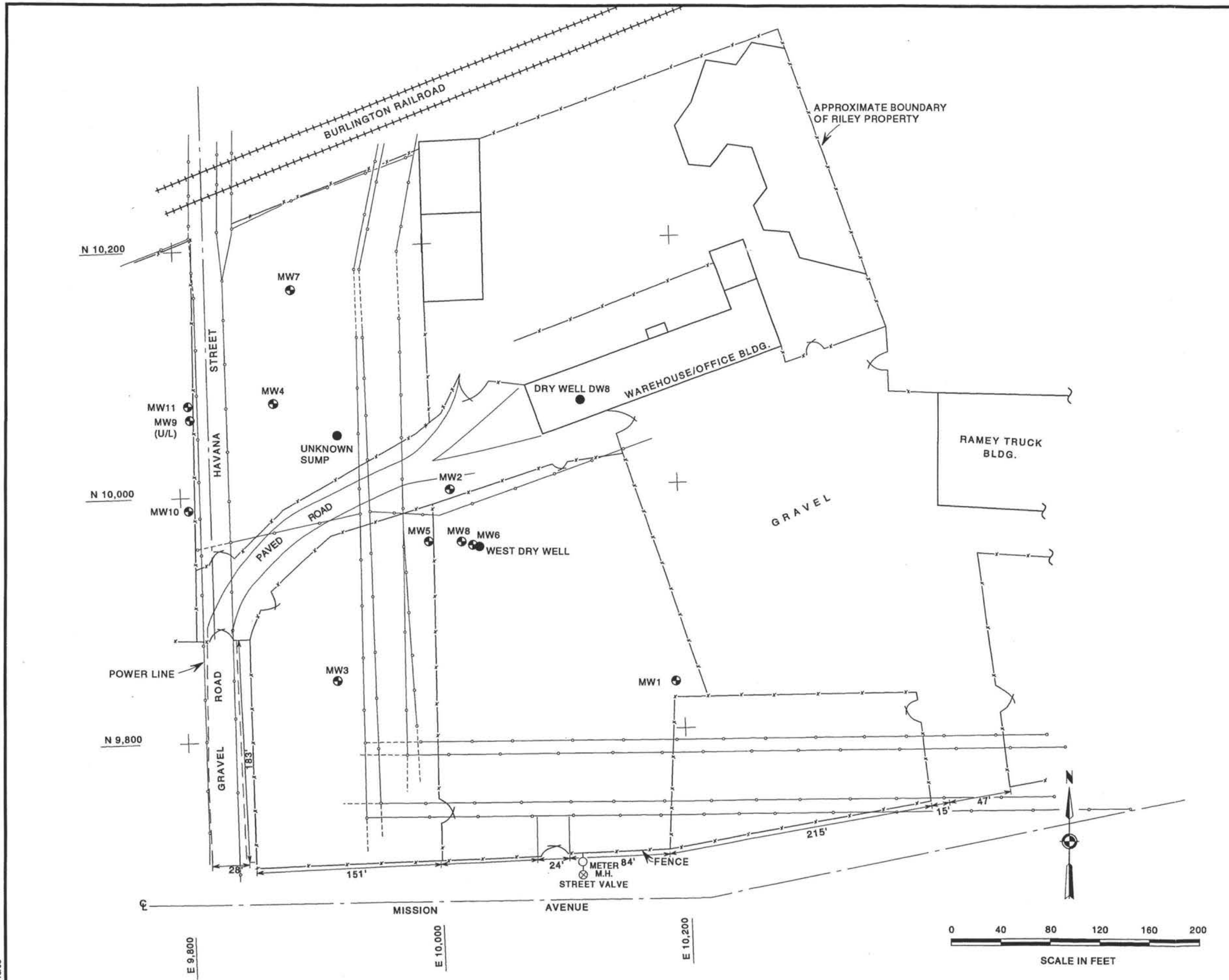
GENERAL ELECTRIC/SPOKANE

**SITE LOCATION MAP**

| Job Number | Drawing No. |
|---|---|
| 19099 | FIGURE 1-1 |

SCAPR-001-A
5/11/93


SIZE D 22 X 34
EXPLANATION
WWP Approximate property boundary and owners
Site boundary
BURLINGTON RAILROAD
RILEY
CONCRETE PAD
SUMP S5
DRY WELL S3
DRY WELL S7
SUMP S6
WAREHOUSE/OFFICE BLDG.
DRY WELL DW8
"STATE ASSESSED"
N 10,200
MW7
HAVANA STREET
MW11
MW9 (U/L)
MW4
SUMP S2
UNKNOWN SUMP
N 10,000
MW10
LAWTON CONVERTER
PAVED ROAD
WWP
SUMP S1
NORTH SUMP
RAMEY TRUCK BLDG
GRAVEL
MW5
TANK-S4
WEST DRY WELL
MW6
VERTICAL STANDPIPE
VARNISH PIT
SUMP S8
MW8
OFFICE/SHOP BLDG
SUMP S10
SOUTH DRY WELL
SUMP S9
TRANSFORMER OIL TANKS
GENERAL ELECTRIC
ASPHALT PAVED AREA
WATER
MW1
POWER LINE
MW3
N 9,800
GRAVEL ROAD
WWP
FENCE
METER M.H
STREET VALVE
MISSION AVENUE
151'
77'
24'
84'
215'
15'
47'
E 9,800
E 10,000
E 10,200
N
0 40 80 120 160 200
SCALE IN FEET
BECHTEL SAN FRANCISCO
GENERAL ELECTRIC/SPOKANE
SITE OWNERSHIP AND FORMER FACILITIES
JOB No. 19099
DRAWING No. FIGURE 1-2
REV. B
SCAPR-002-B
8/17/93

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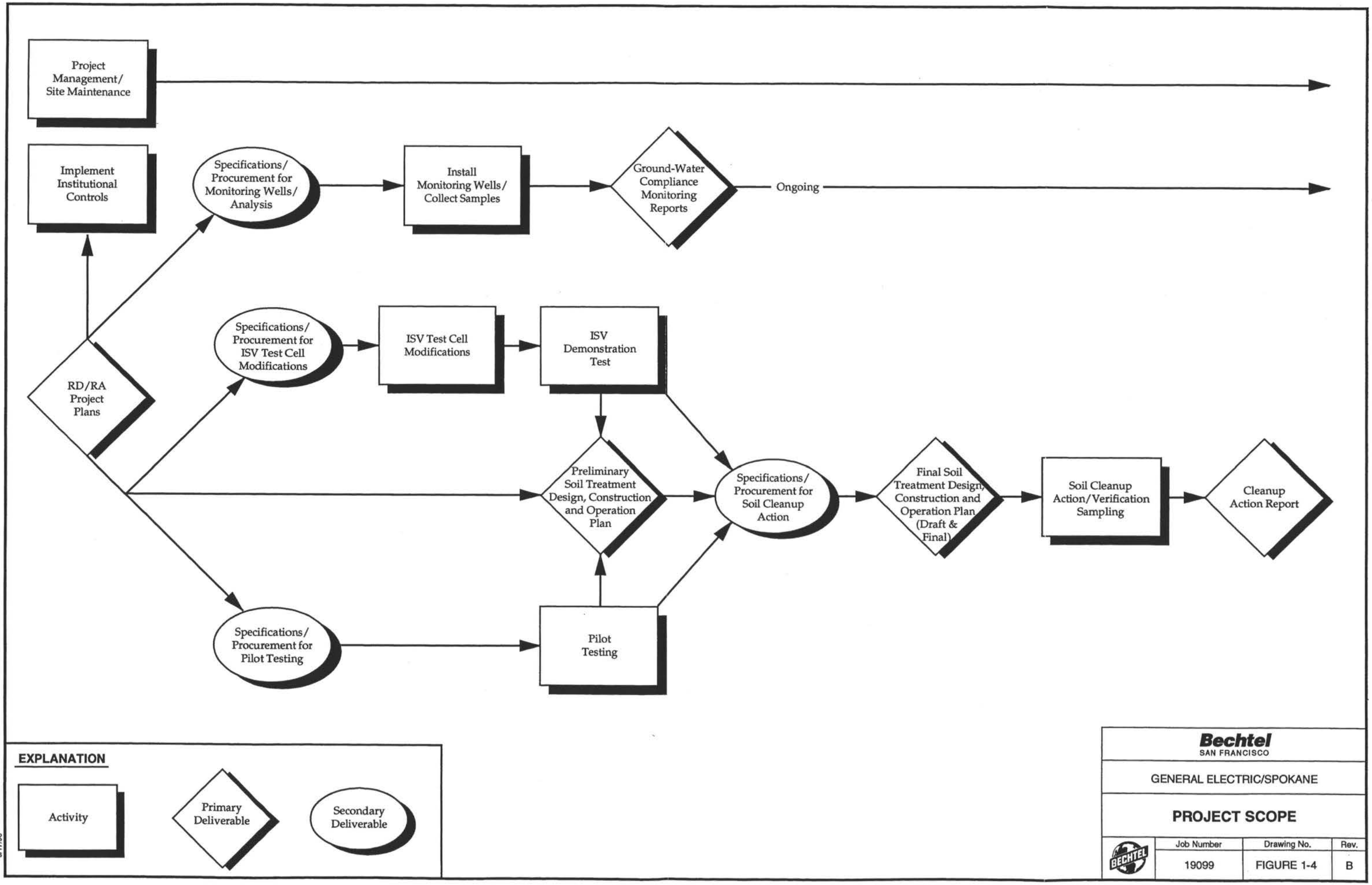
GENERAL ELECTRIC/SPOKANE

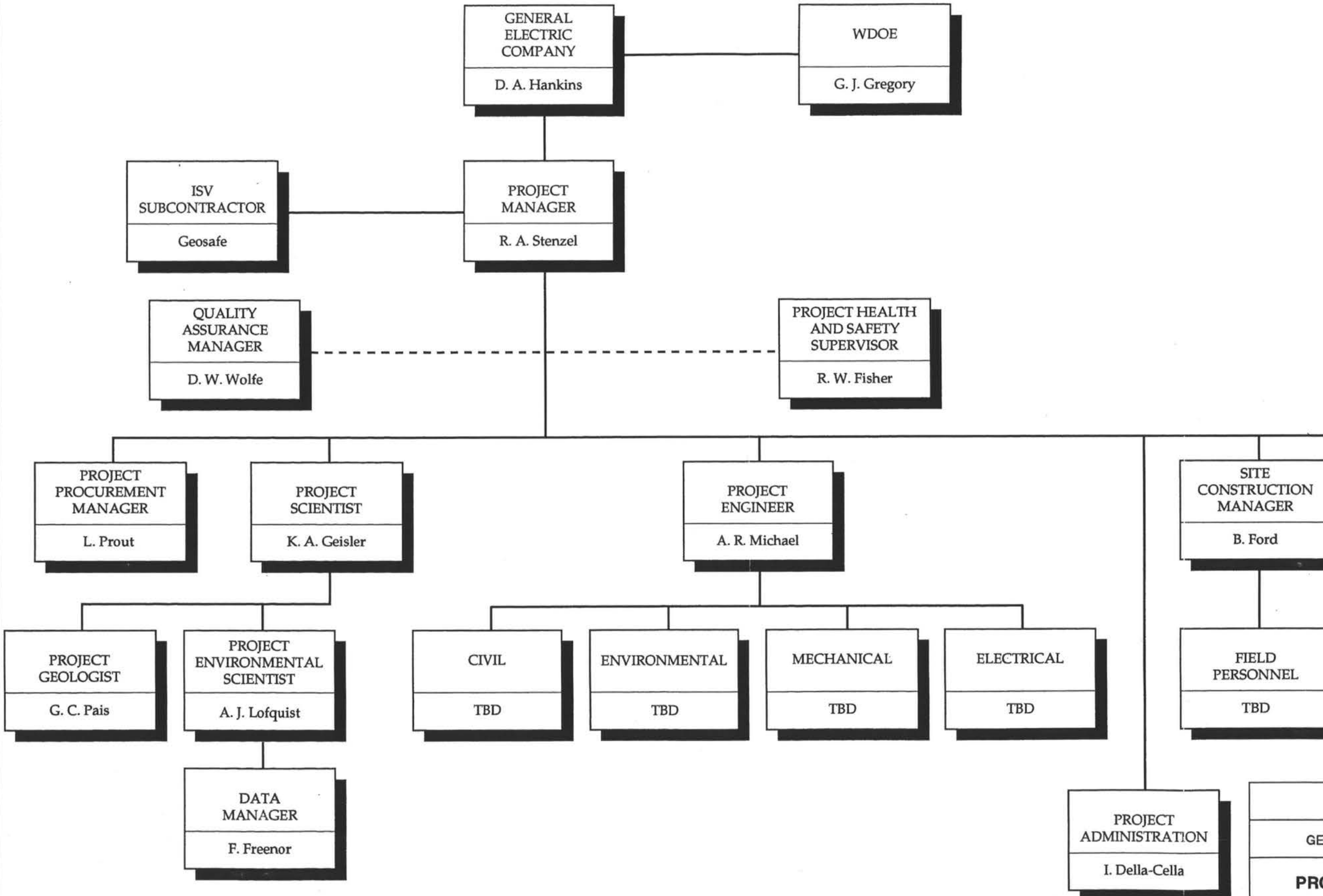
**EXISTING SITE FEATURES**

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 1-3 | A |

GESP005da/RD_RA WP/SCAPR/SCAPR-022-A
8/18/93




GESP010da/RD_RA WP/SCAPR-003-B
9/17/93

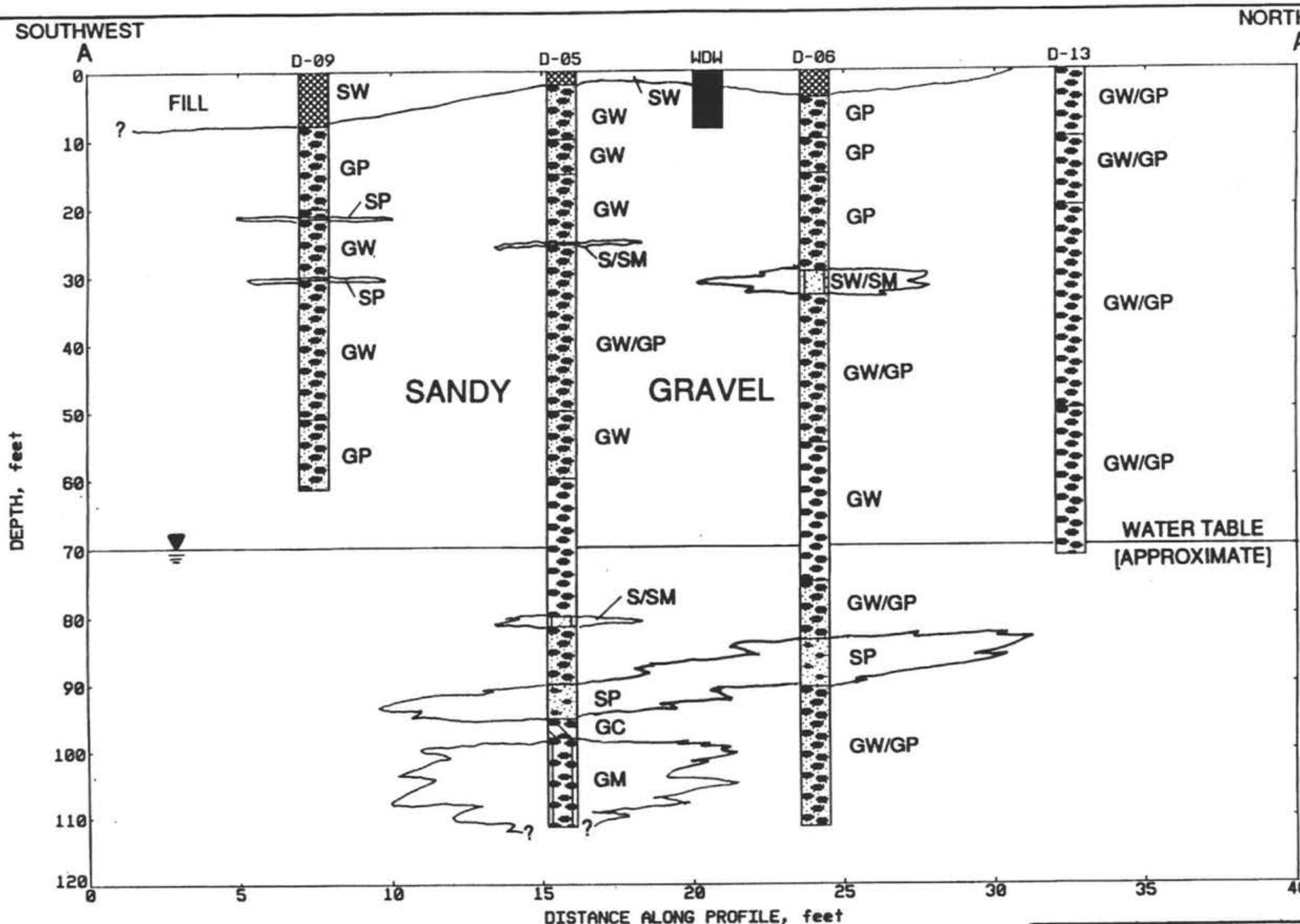



**NOTE:** TBD = To be determined

| | | | |
|---|---|---|---|
| Bechtel SAN FRANCISCO | | | |
| GENERAL ELECTRIC/SPOKANE | | | |
| PROJECT ORGANIZATION | | | |
| BECHTEL | Job Number | Drawing No. | Rev. |
| | 19099 | FIGURE 1-5 | D |

GESP015da/RD_RA WP/SCAPR/SCAPR-004-D
10/13/93

SCAPR-005-A
7/13/93




BECHTEL
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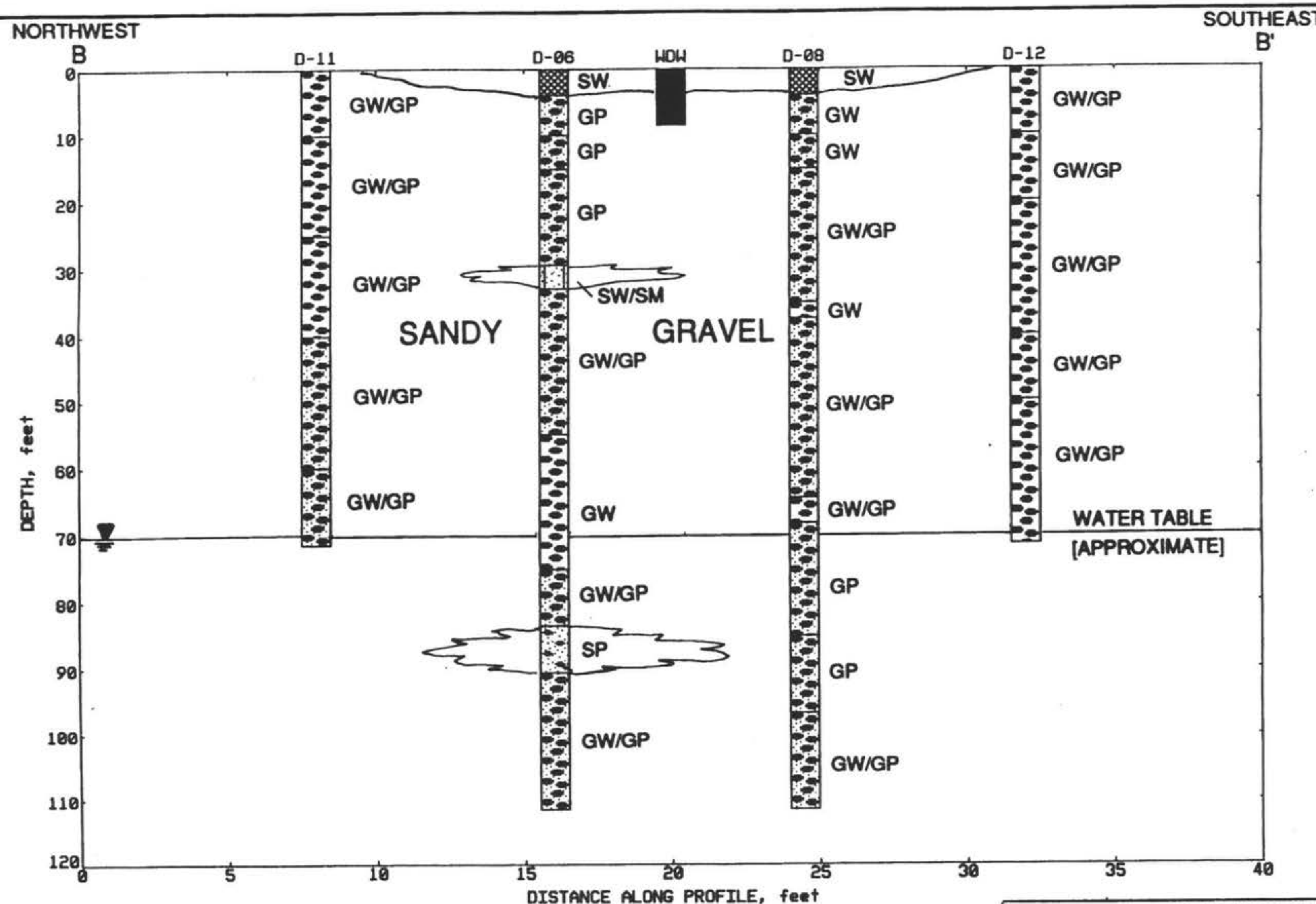
GENERAL ELECTRIC/SPOKANE

GEOLOGIC SECTION A - A'

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 2-1 | A |

SCAPR-006-A
7/13/93




**BECHTEL**
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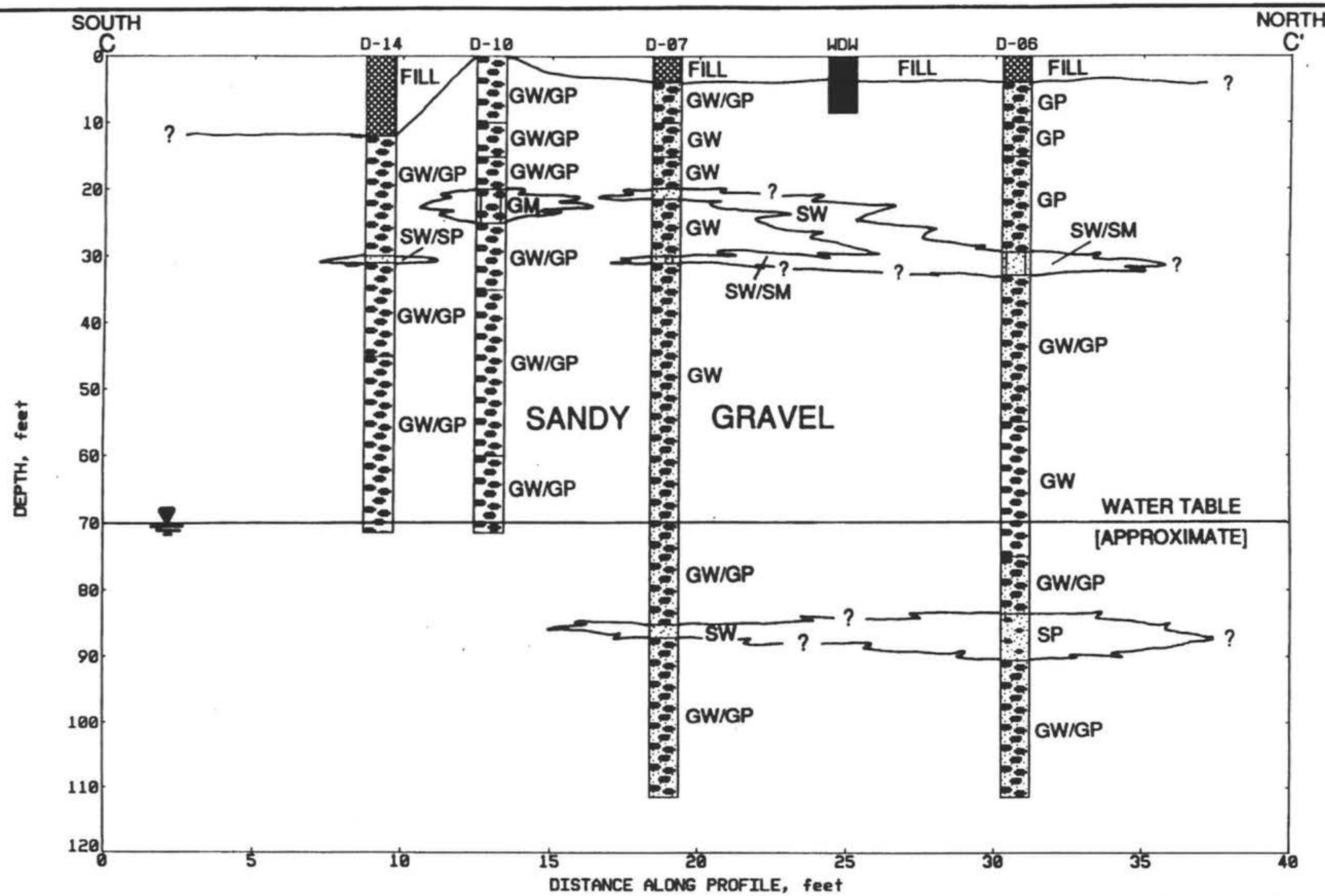
GENERAL ELECTRIC/SPOKANE

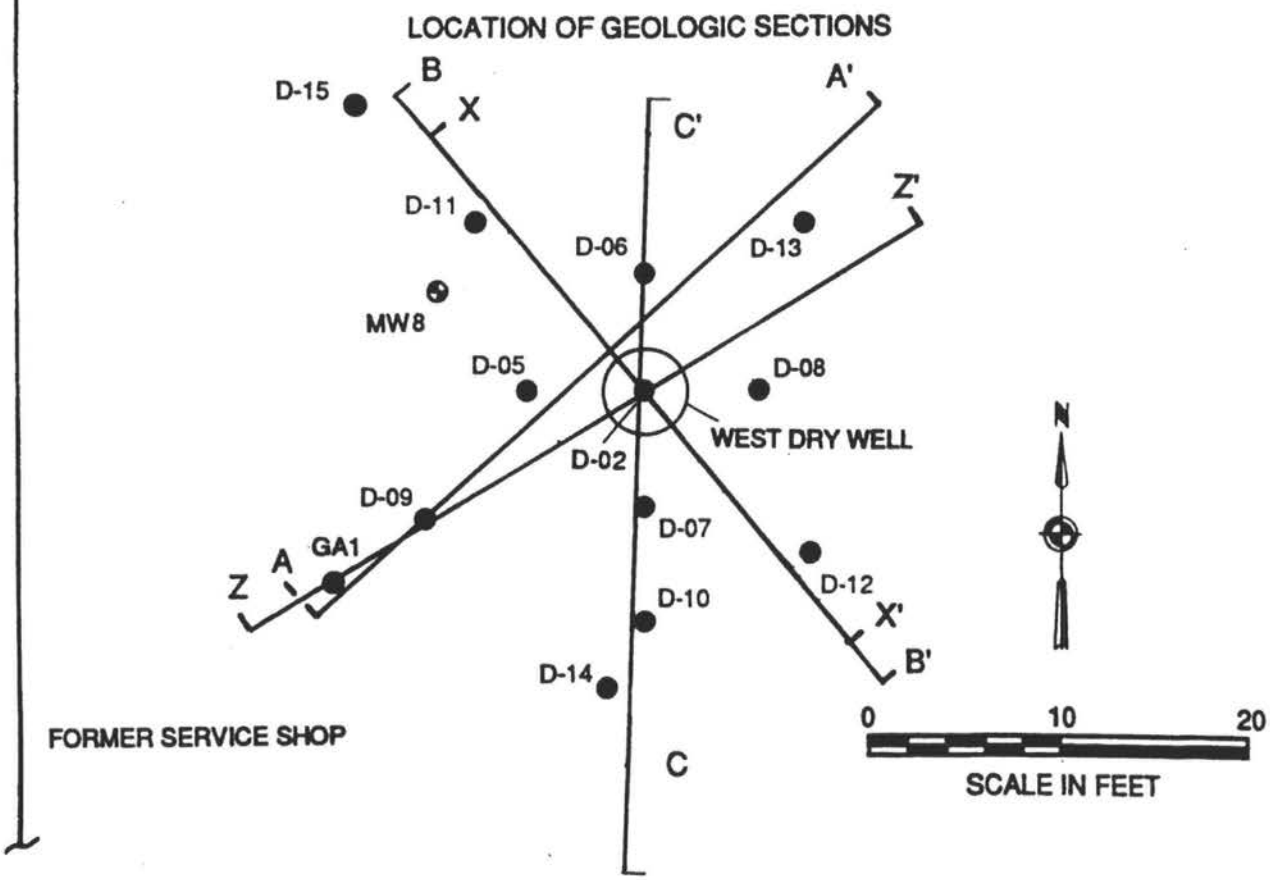
GEOLOGIC SECTION B - B'

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 2-2 | A |

SCAPR-007-A
7/13/93




| | | |
|---|---|---|
| **BECHTEL** SAN FRANCISCO | | |
| GENERAL ELECTRIC/SPOKANE | | |
| GEOLOGIC SECTION C - C' | | |
| JOB No. | DRAWING No. | REV. |
| 19099 | FIGURE 2-3 | A |




**EXPLANATION OF GEOLOGIC SECTIONS**

- Fill (SW) Sand
- (GW) Sandy Gravel or Gravel [Well Graded]
- (GP) Sandy Gravel or Gravel [Poorly Graded]
- (GM) Silty Gravel
- (GC) Clayey Gravel
- (SW) Sand [Well Graded]
- (SP) Sand [Poorly Graded]
- (S) Sand
- (SM) Silty Sand

**NOTES:**

(1) Soil classification codes are from the Unified Soil Classification System.

(2) Combined codes (e.g. GW/GP) indicate intermediate or variable grading.

(3) A-A', B-B', C-C' are geologic sections shown in Figs. 2-1 thru 2-3.

(4) X-X' and Z-Z' are cross-sections showing the distribution of PCBs and TPH respectively on Figs. 2-8 and 2-9.

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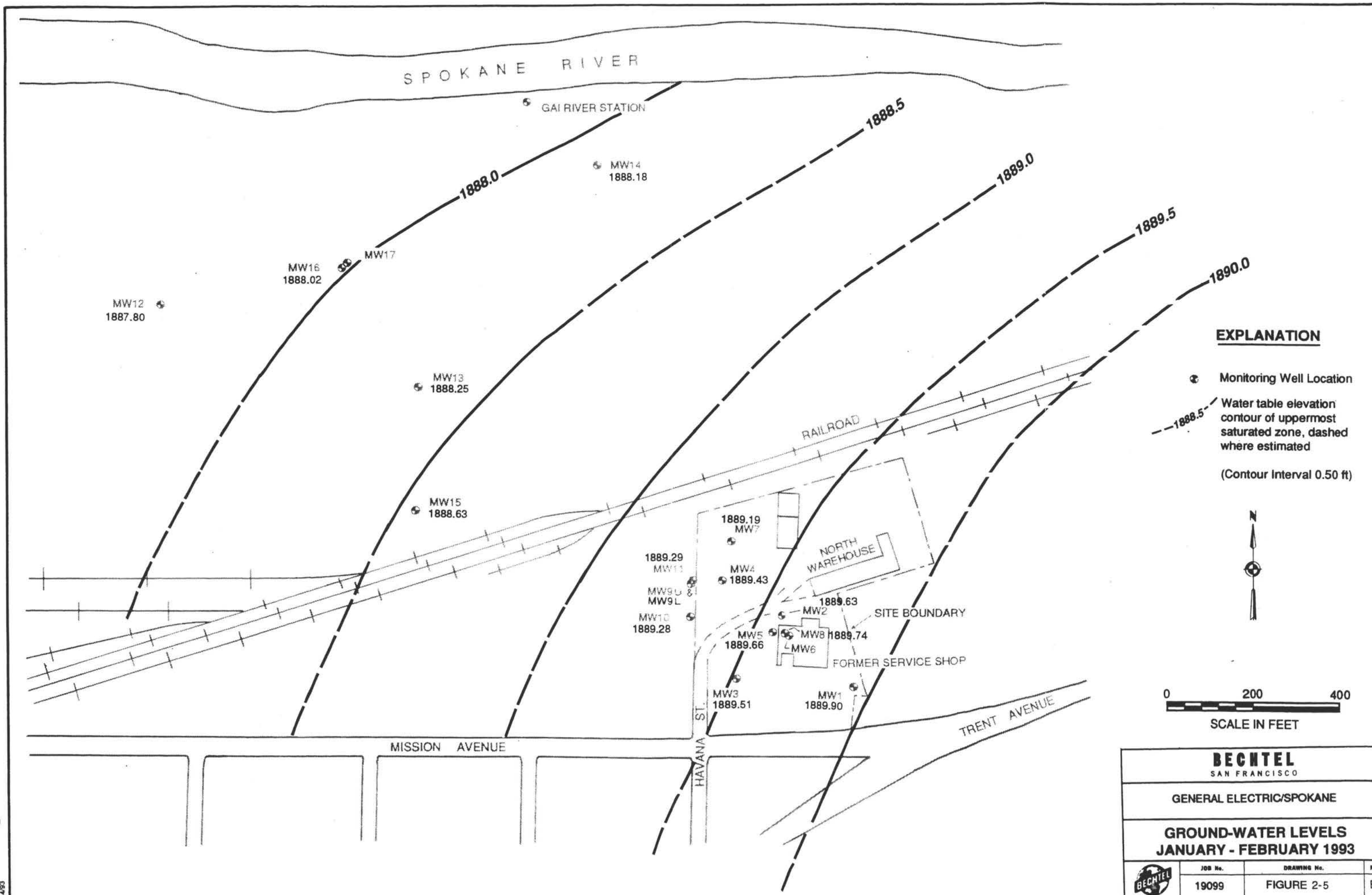
**LOCATION AND EXPLANATION FOR GEOLOGIC SECTIONS**

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 2-4 | C |

SCAPR-008-C
9/16/93

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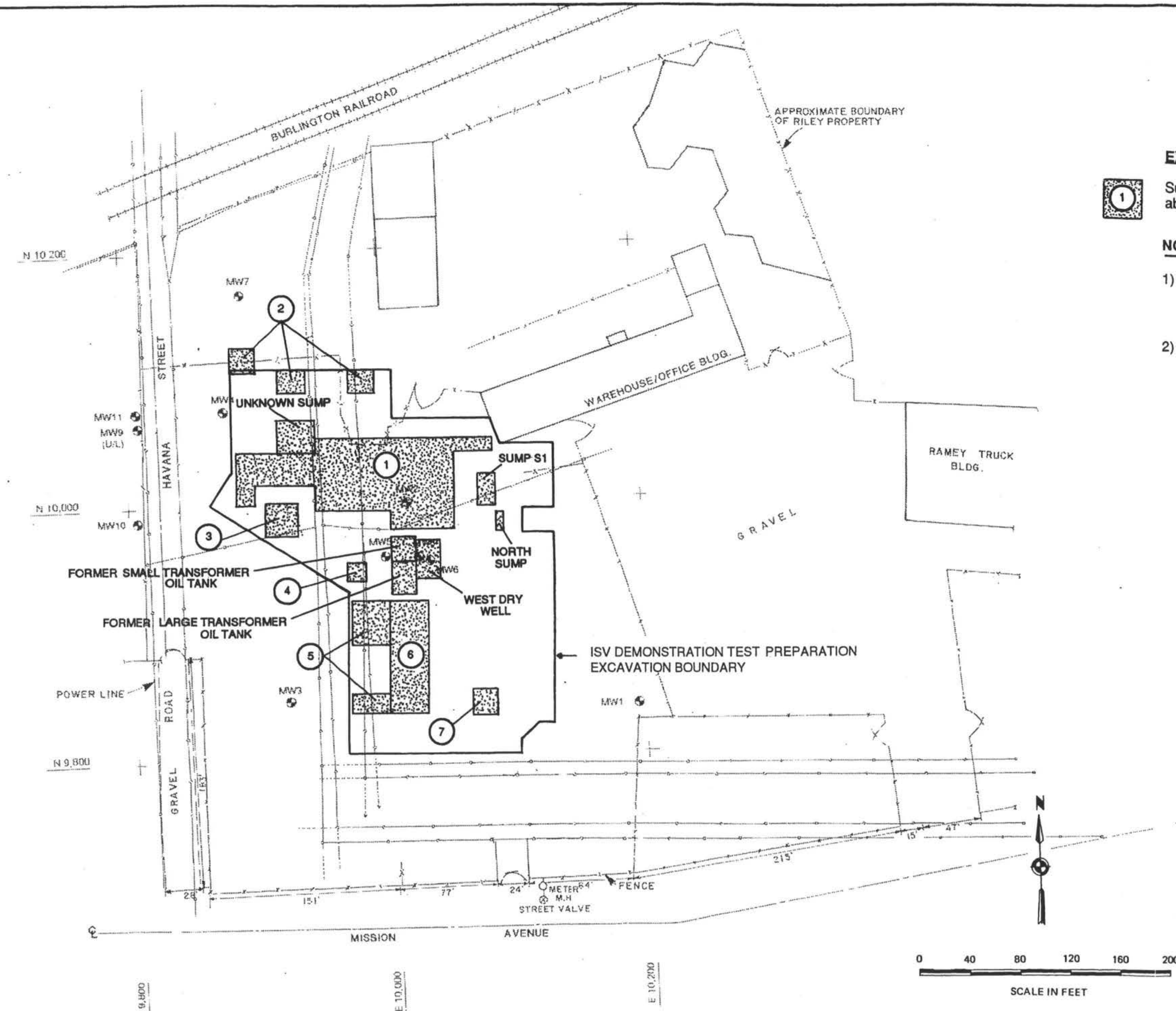
GENERAL ELECTRIC/SPOKANE

GROUND-WATER LEVELS
JANUARY - FEBRUARY 1993

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 2-5 | B |

SCAPR-009-B
9/14/93




## EXPLANATION

(1) Subsurface area with remaining PCB concentration above 10 mg/kg.

## NOTES:

1) This drawing represents estimated subsurface areas with remaining PCB concentrations above 10 mg/kg. Depth of overlying backfill varies.

2) This drawing does not include the volume reduction fines which may require treatment.

SIZE D

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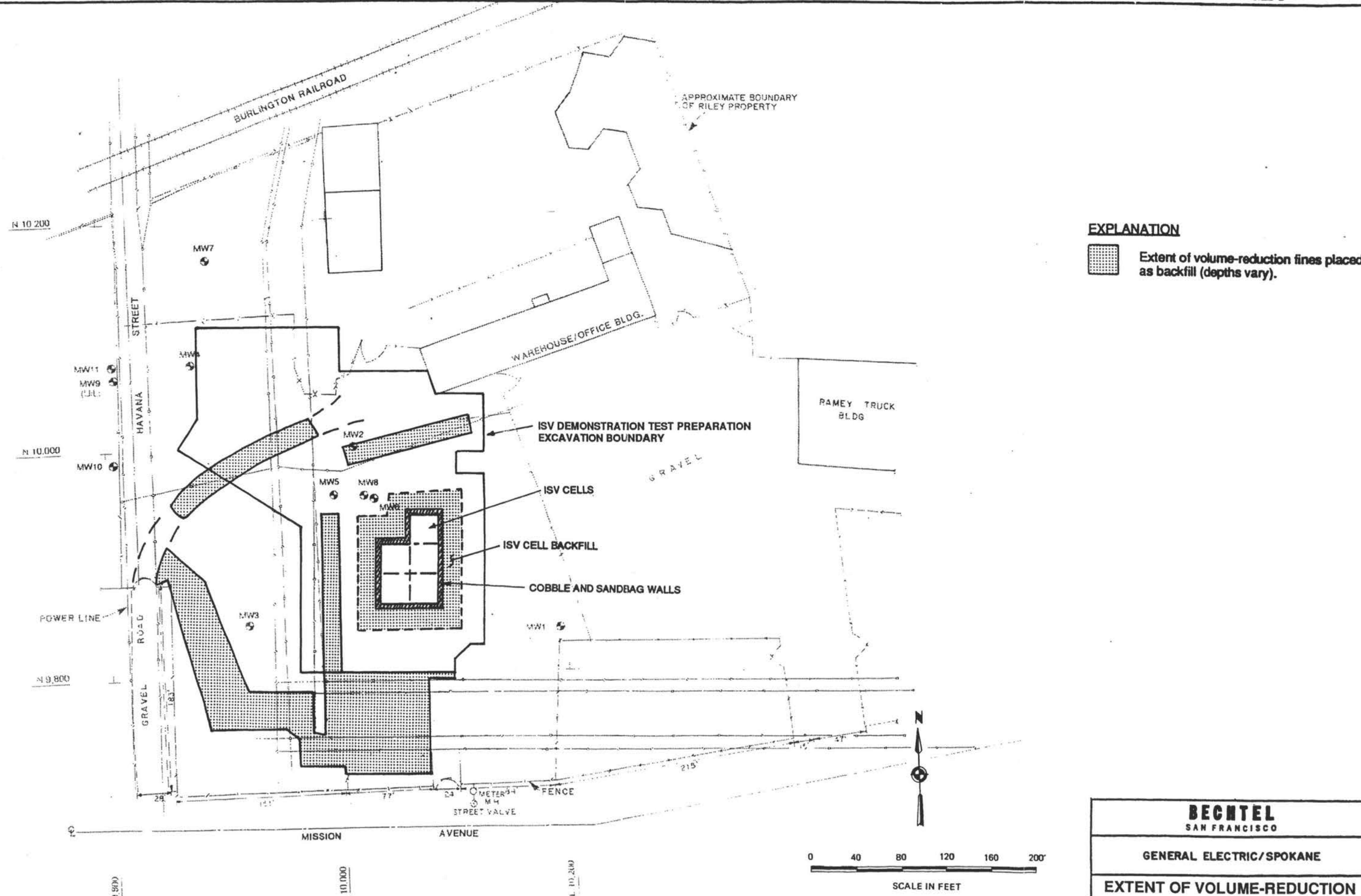
**AREAS OF SOIL TO BE TREATED**

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 2-6 | C |

SCAPR-010-C
9/16/93

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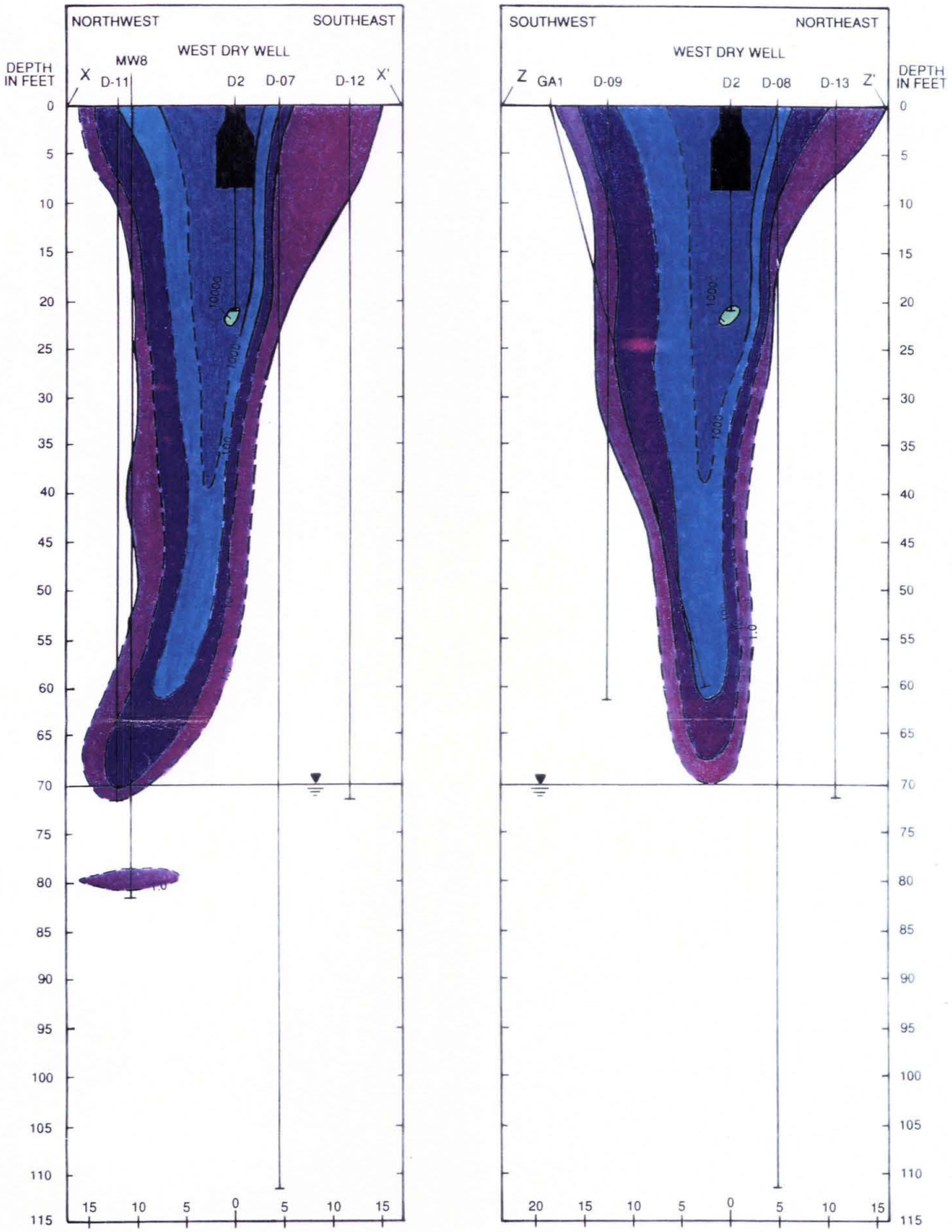
**EXTENT OF VOLUME-REDUCTION FINES BACKFILL**

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 2-7 | B |

SCAPR-011-B
9/16/93

SCAPR-013-A
7/12/93




EXPLANATION

10 — Line of approximately equal PCB concentration (mg/kg)

≥ 10,000 mg/kg

1,000 - 10,000 mg/kg

100 - 1,000 mg/kg

10 - 100 mg/kg

1 - 10 mg/kg

0 10 20
SCALE IN FEET

NOTE:

For location of section line see Figure 2-4.

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GENERAL ELECTRIC/SPOKANE

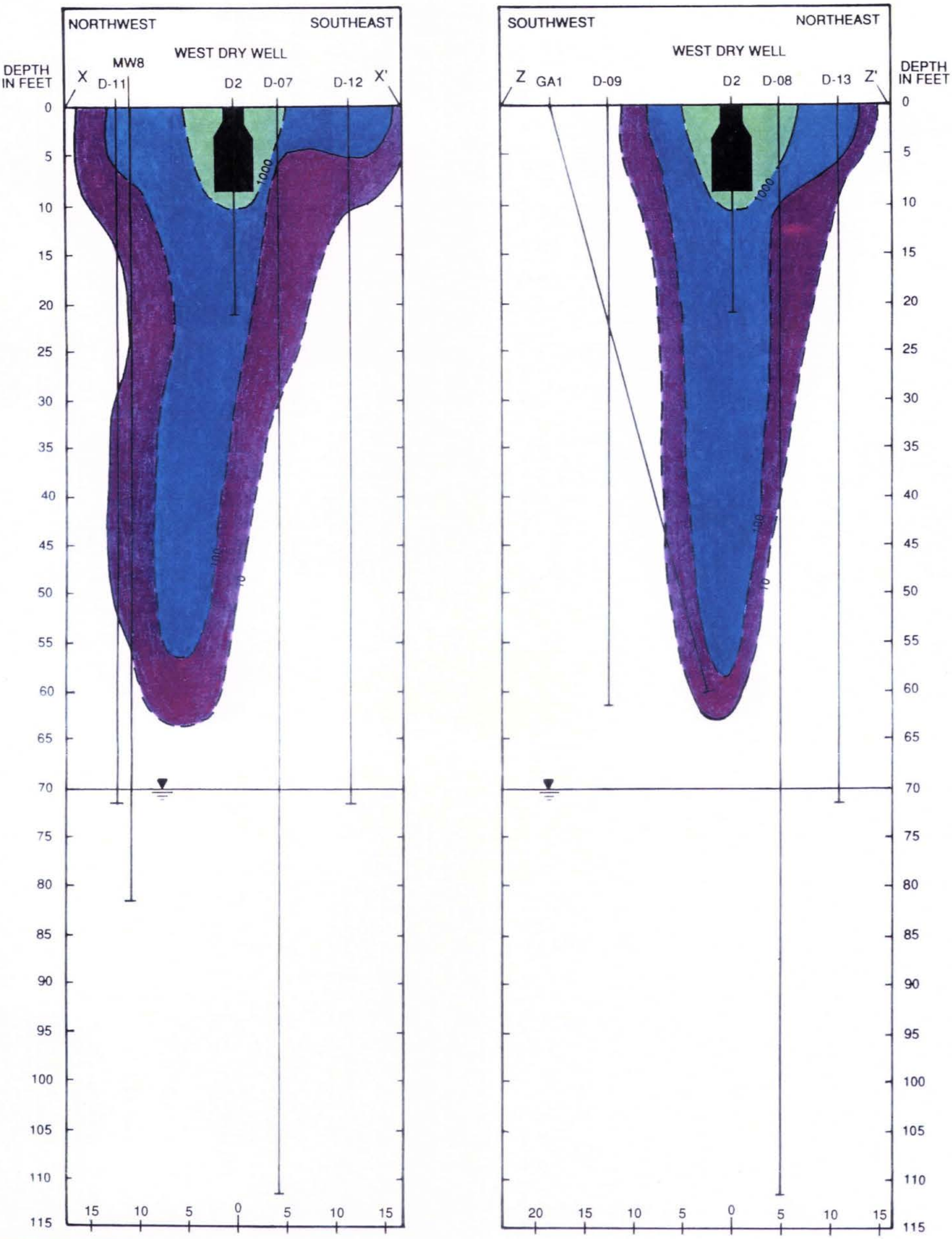
VERTICAL EXTENT OF PCBs IN THE WEST DRY WELL AREA SOILS

| JOB No. | DRAWING No. | REV. |
| --- | --- | --- |
| 19099 | FIGURE 2-8 | A |

Color #1

5, 1 V1

SCAPR-014-A
7/13/93




EXPLANATION

10 — Line of approximately equal total Petroleum Hydrocarbons concentration (mg/kg)

≥ 1,000 mg/kg

100 - 1,000 mg/kg

10 - 100 mg/kg

0 10 20
SCALE IN FEET

NOTE:

For location of section line see Figure 2-4.

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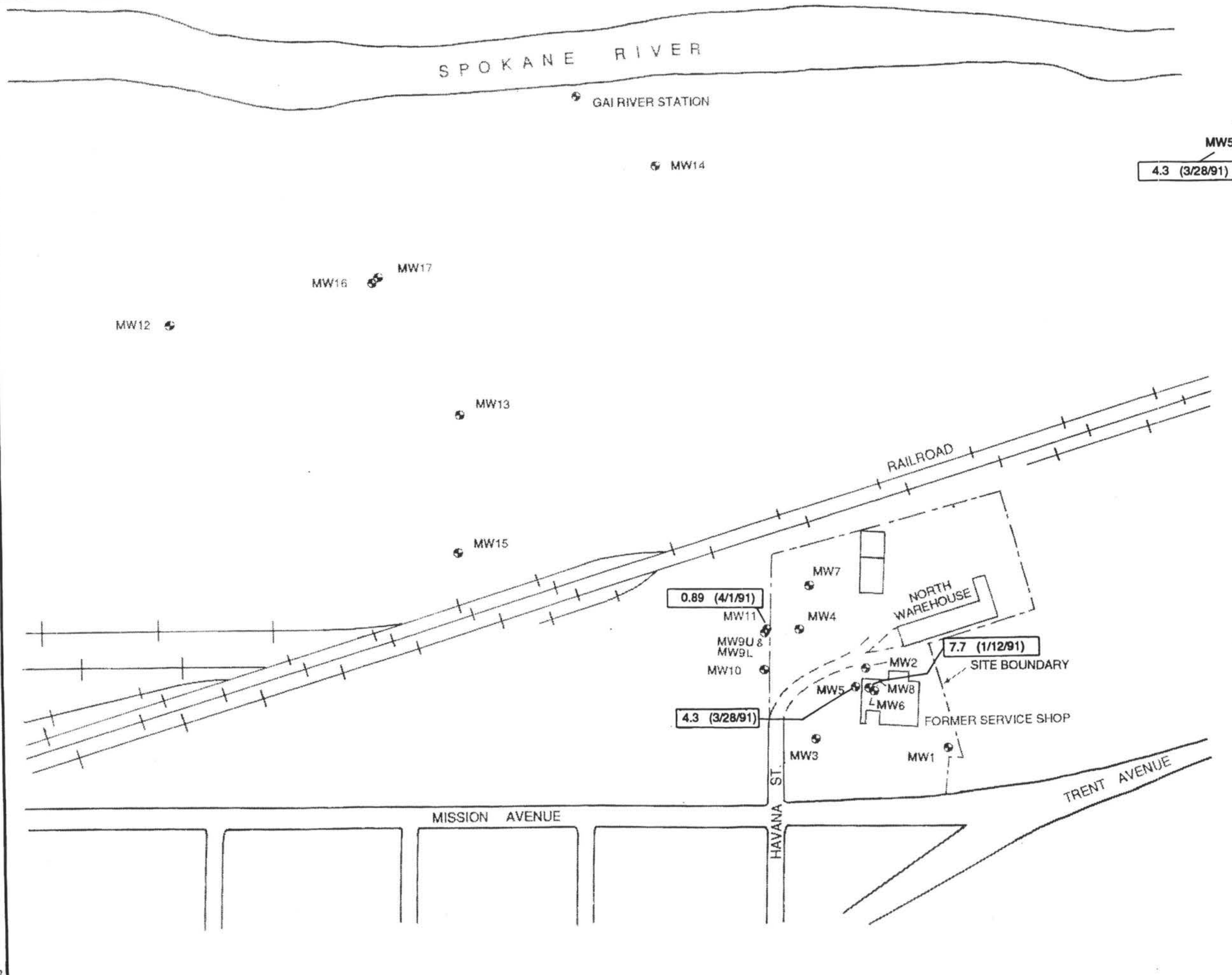
VERTICAL EXTENT OF TPH IN THE WEST DRY WELL AREA SOILS

| JOB No | DRAWING No | REV |
|---|---|---|
| 19099 | FIGURE 2-9 | A |

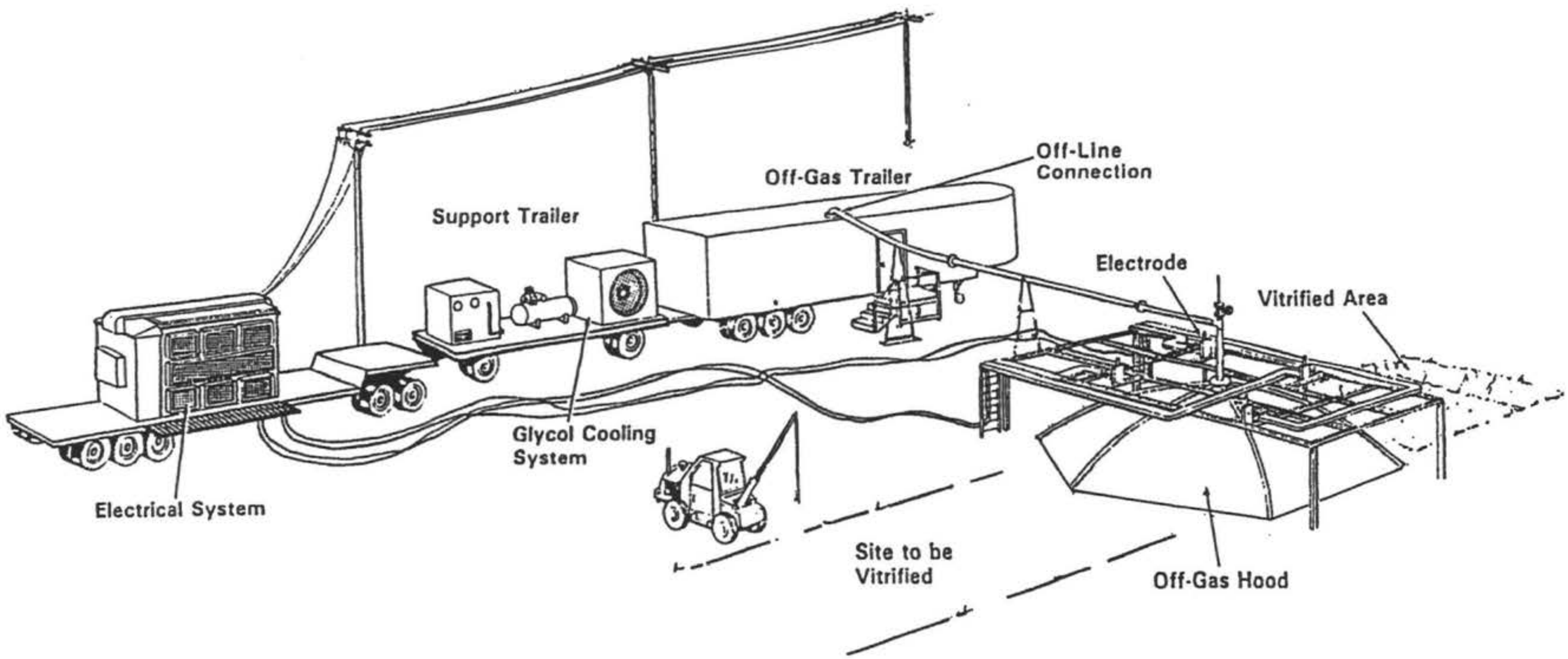
color #2

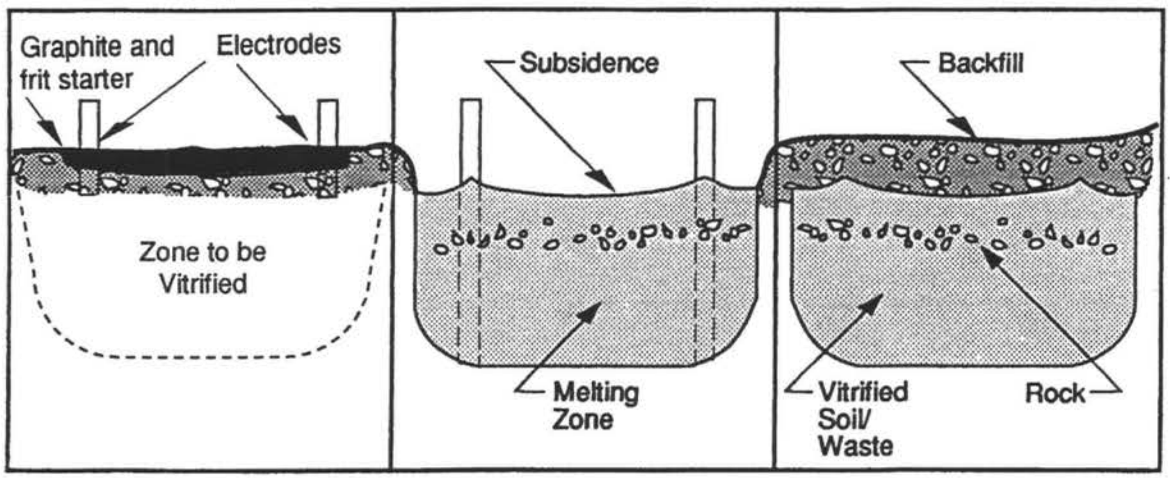
5.1 V1




| BECHTEL SAN FRANCISCO | | |
|---|---|---|
| GENERAL ELECTRIC/SPOKANE | | |
| PCBs IN GROUND WATER | | |
| JOB No. | DRAWING No. | REV. |
| 19099 | FIGURE 2-10 | B |

SCAPR-016-B
mf 8/19/93




(Courtesy of Geosafe Corporation)

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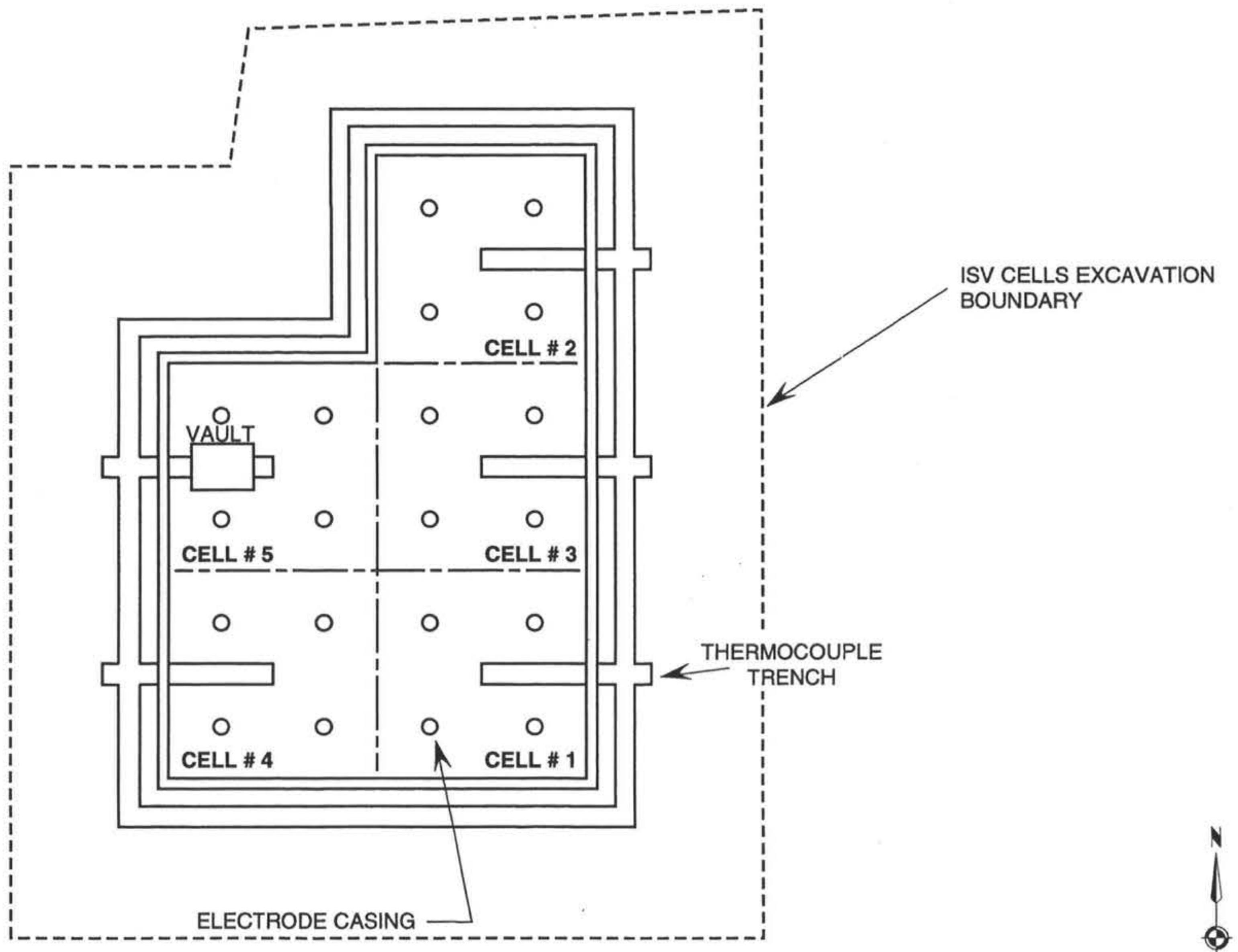
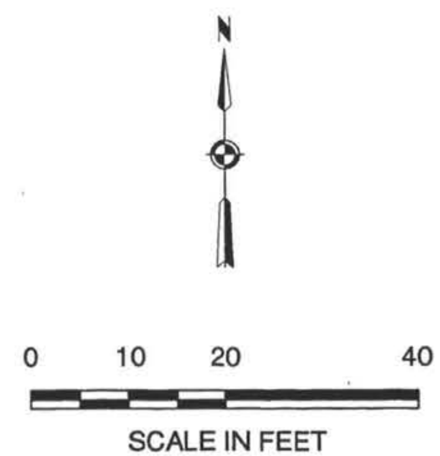
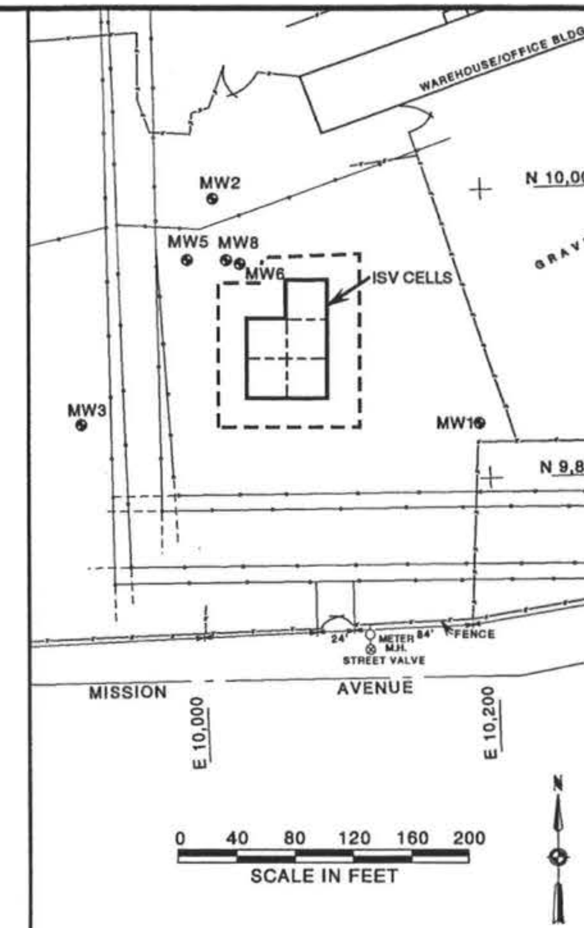
GENERAL ELECTRIC/SPOKANE

**SCHEMATIC OF SOIL VITRIFICATION CONCEPT**

| Job Number | Drawing No. | Rev. |
| --- | --- | --- |
| 19099 | FIGURE 3-1 | B |




KEY PLAN

**NOTES:**

1) A schematic profile through the test cells is shown in Figure 3-3.

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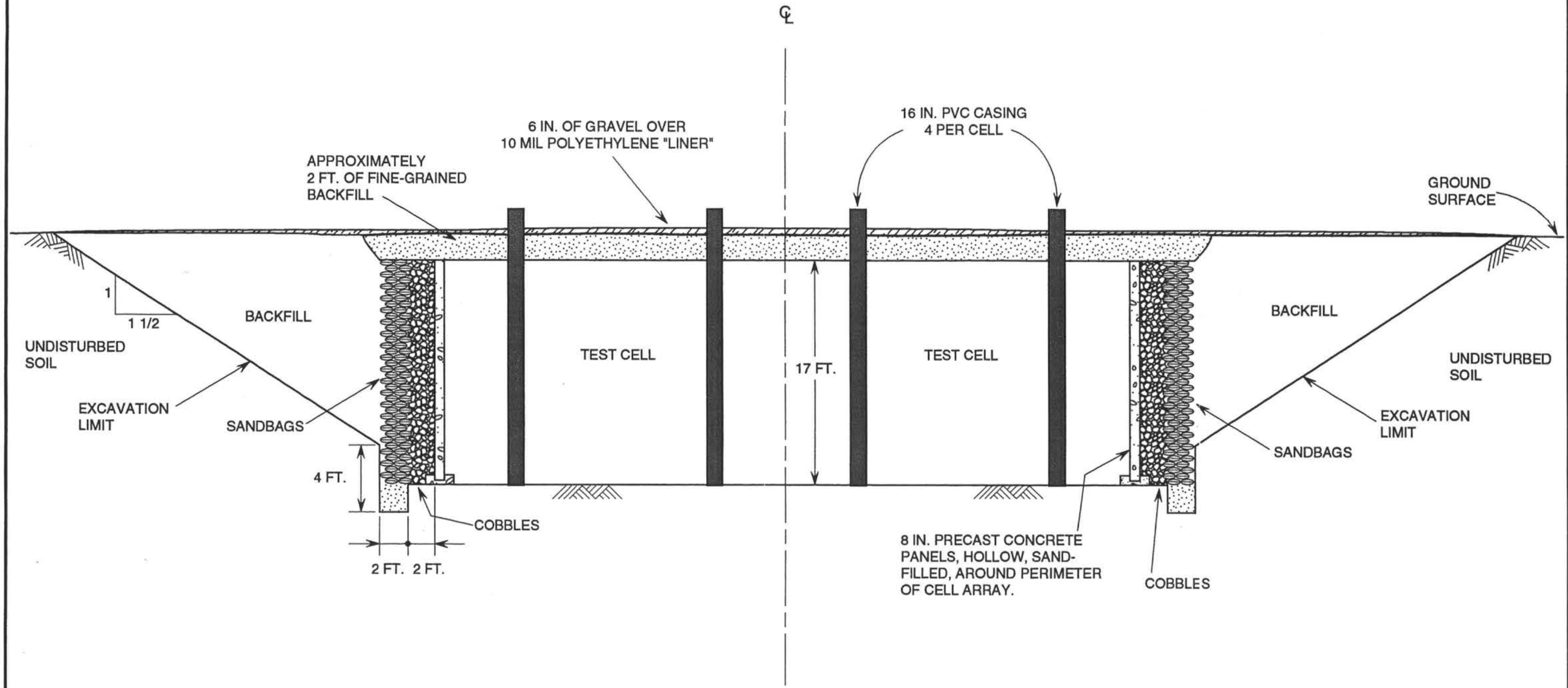
**PLAN VIEW OF THE ISV TEST CELLS**

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 3-2 | B |

GESP009da/RD_RA WP/SCAPR/SCAPR-017-B
9/14/93




NOT TO SCALE

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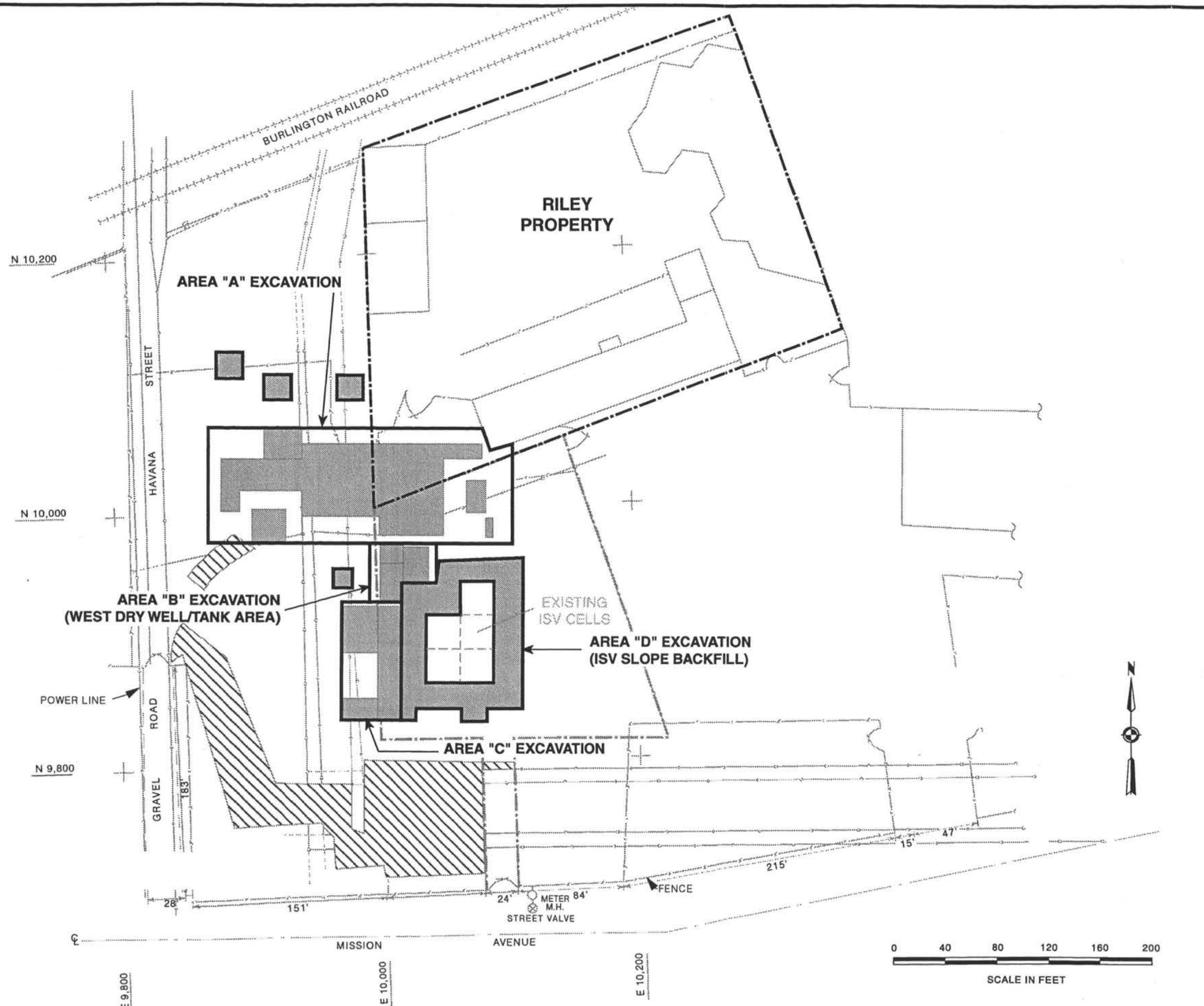
**PROFILE OF THE ISV TEST CELLS**

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 3-3 | D |

GESP015da/RD_RA WP/SCAPR/SCAPR-018-D
10/12/93




**EXPLANATION**

Planned Excavations

Estimated Extent of Subsurface PCB-Containing Soils Above Cleanup Levels

Volume Reduction Fines

GE Property Line

**NOTES:**

1) The ISV slope backfill is assumed to be PCB-containing. This will be confirmed by additional sampling prior to the cleanup action design.

0 40 80 120 160 200

SCALE IN FEET

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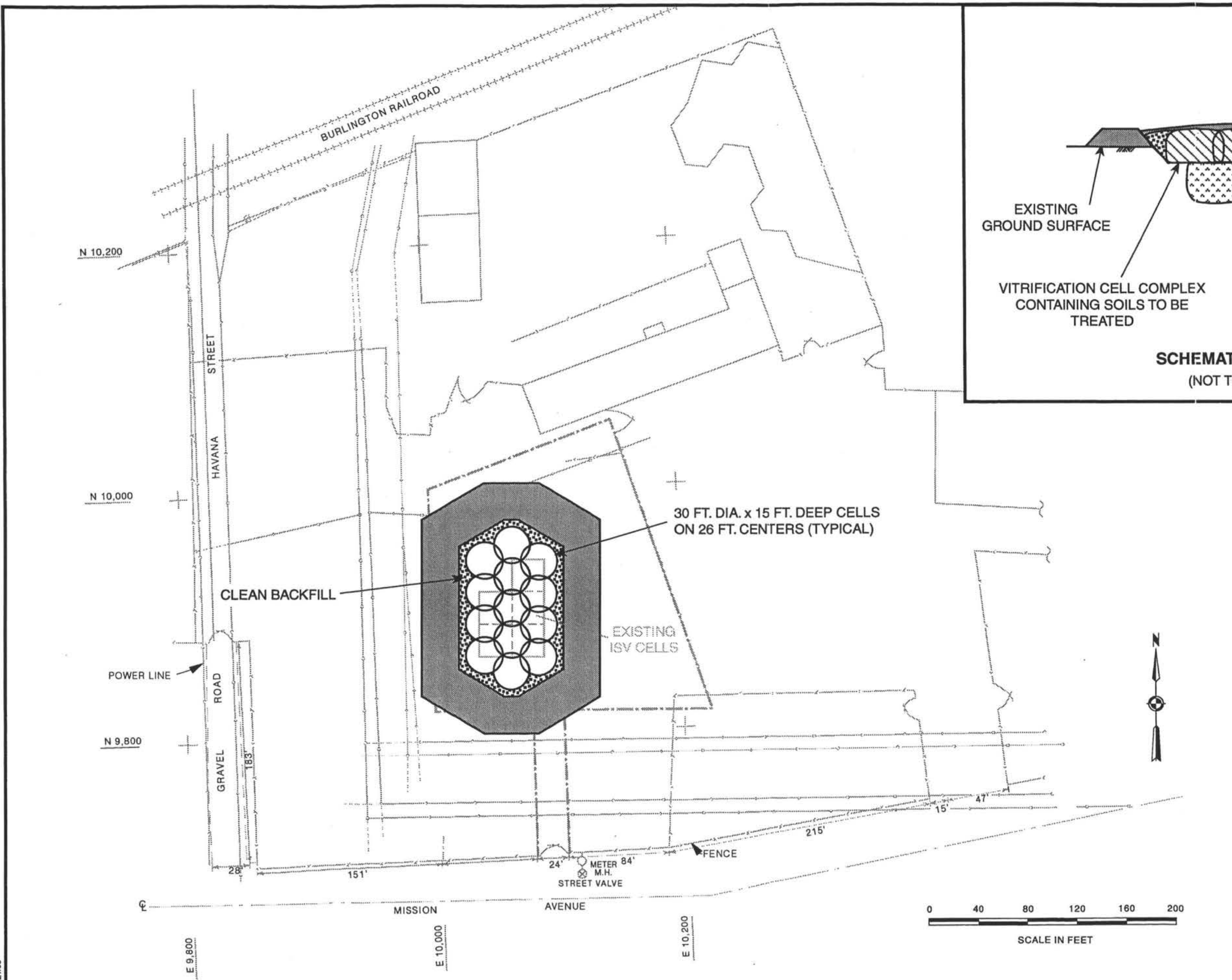
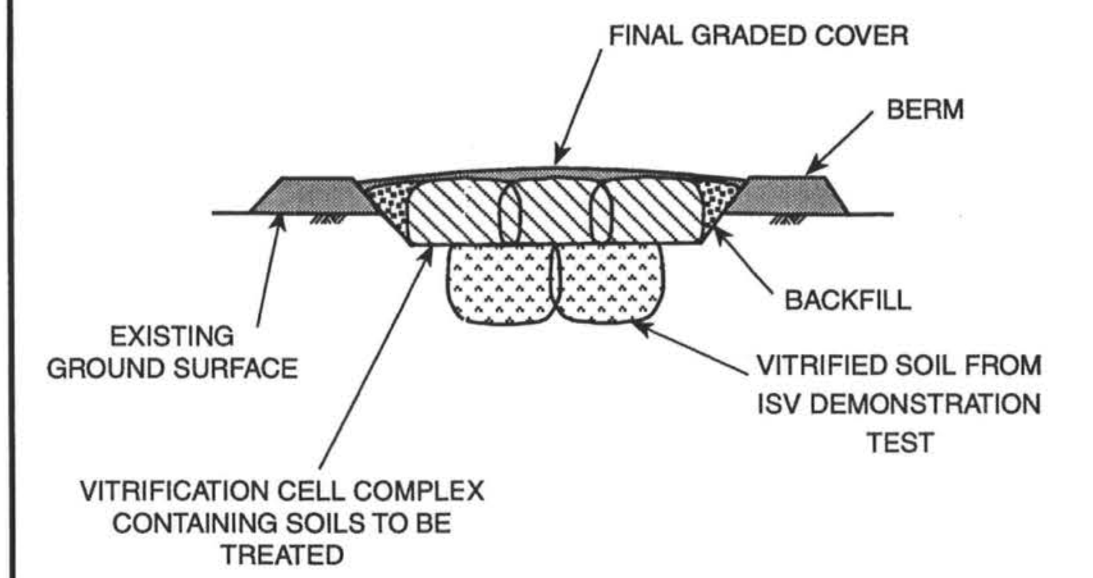
**CONCEPTUAL SITE LAYOUT FOR EXCAVATION**

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 3-4 | A |

GESP008d...WP/SCAPR/SCAPR-024-A
9/2/93

93-2442b.003 7-15-93 ra/rs:6
REV.da 8/17/93




**SCHEMATIC PROFILE**
(NOT TO SCALE)

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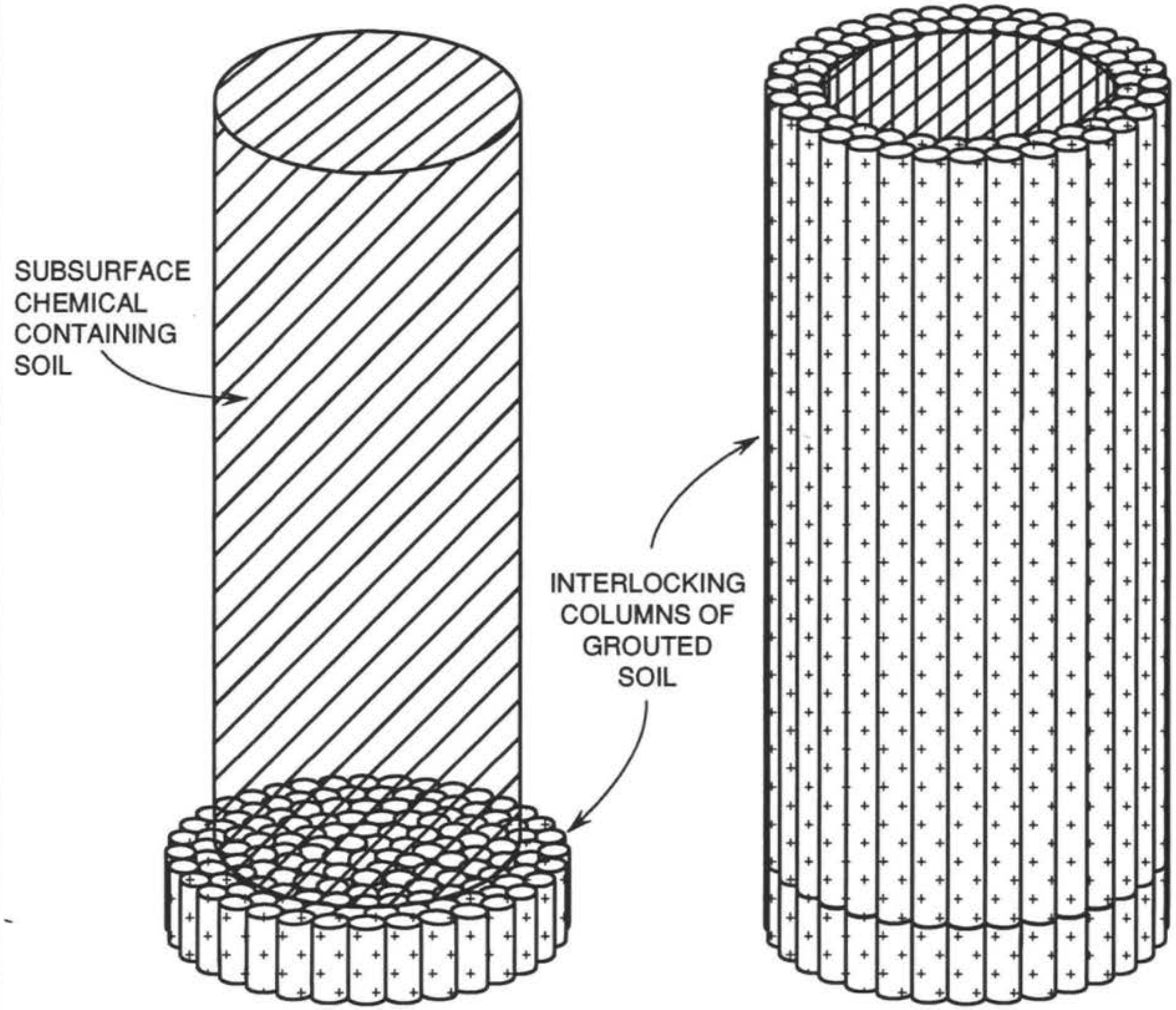
**CONCEPTUAL SITE LAYOUT FOR VITRIFICATION**

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 3-5 | B |

GESP011da/F...P/SCAPR/SCAPR-025-B
9/21/93

93-2442b.003 7-15-93 rs/rs:6
REV.da 8/17/93

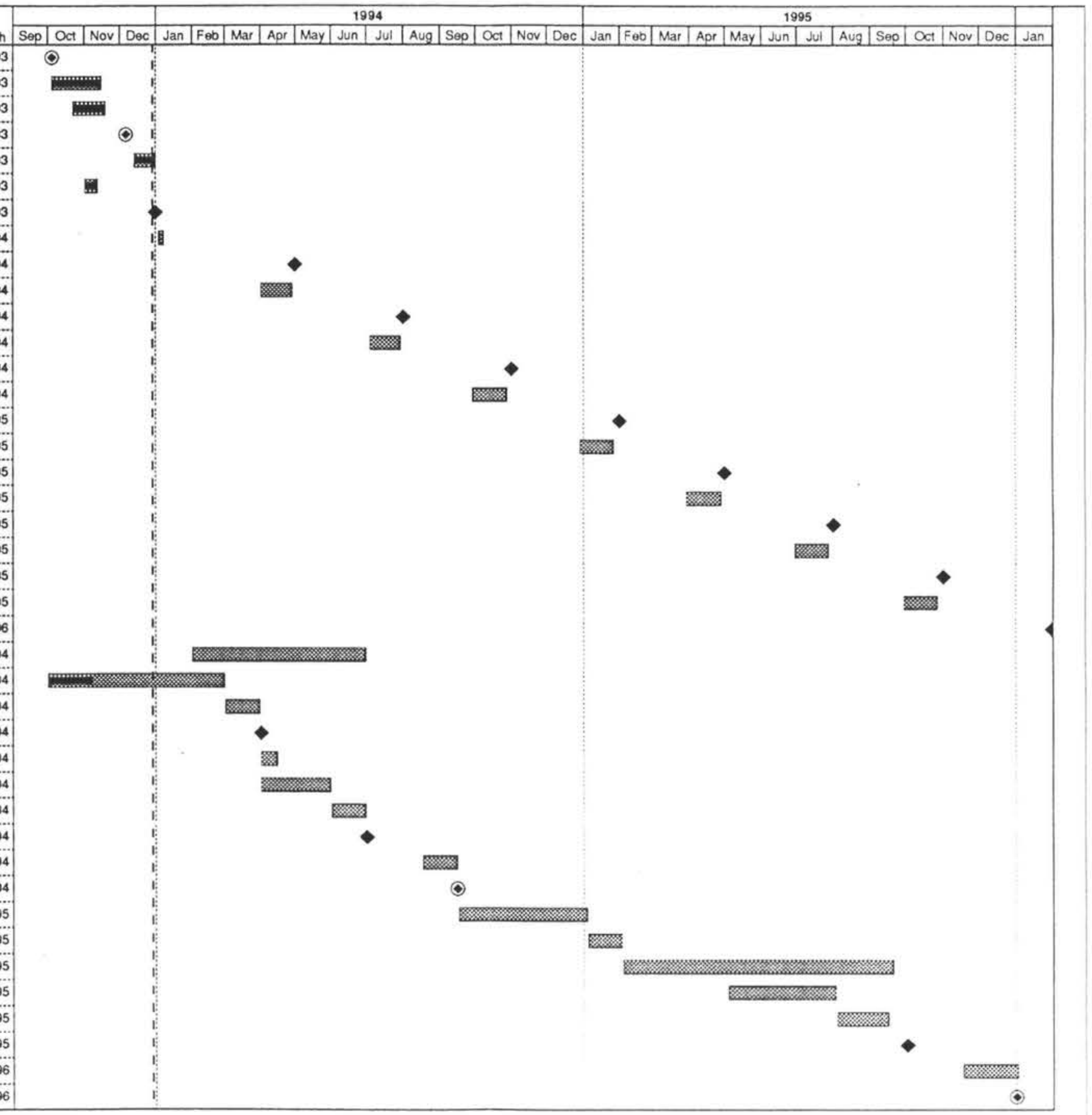



**STAGE 1**
BOTTOM BARRIER
IN PLACE

**STAGE 2**
BOTTOM AND SIDE BARRIERS
IN PLACE

| | | | |
|---|---|---|---|
| **Bechtel** SAN FRANCISCO | | | |
| GENERAL ELECTRIC/SPOKANE | | | |
| **CONCEPTUAL SCHEME FOR DEEP SOIL GROUTING** | | | |
| BECHTEL | Job Number | Drawing No. | Rev. |
| | 19099 | FIGURE 3-6 | B |

| Name | Early Start | Early Finish |
|---|---|---|
| Final Consent Decree | 10/4/93 | 10/4/93 |
| GE Review/BEI Revise & Submit Draft Project Plans | 10/4/93 | 11/15/93 |
| Revise/Submit Draft Project Plans to WDOE | 10/22/93 | 11/18/93 |
| Draft Project Plans Deadline | 12/6/93 | 12/6/93 |
| Submit Final Project Plans - Estimated | 12/13/93 | 12/31/93 |
| Install Monitoring Wells/Collect Design Data | 11/1/93 | 11/12/93 |
| Install Monitoring Wells Deadline | 12/31/93 | 12/31/93 |
| Sample Wells - 1st Qtr | 1/3/94 | 1/7/94 |
| 1st Qtr 1994 GWMCR Deadline | 4/30/94 | 4/30/94 |
| Sample Wells - 2nd Qtr1994 | 4/1/94 | 4/28/94 |
| 2nd Qtr 1994 GWMCR Deadline | 7/31/94 | 7/31/94 |
| Sample Wells - 3rd Qtr 1994 | 7/4/94 | 7/29/94 |
| 3rd Qtr 1994 GWMCR Deadline | 10/31/94 | 10/31/94 |
| Sample Wells - 4th Qtr 1994 | 9/28/94 | 10/27/94 |
| 1st Draft Annual GWMCR Deadline | 1/31/95 | 1/31/95 |
| Sample Wells - 1st Qtr 1995 | 12/28/94 | 1/26/95 |
| 1st Qtr 1995 GWMCR Deadline | 4/30/95 | 4/30/95 |
| Sample Wells - 2nd Qtr 1995 | 3/29/95 | 4/27/95 |
| 2nd Qtr 1995 GWMCR Deadline | 7/31/95 | 7/31/95 |
| Sample Wells - 3rd Qtr 1995 | 6/28/95 | 7/27/95 |
| 3rd Qtr 1995 GWMCR Deadline | 10/31/95 | 10/31/95 |
| Sample Wells - 4th Qtr 1995 | 9/28/95 | 10/26/95 |
| 2nd Draft Annual GWMCR Deadline | 1/31/96 | 1/31/96 |
| ISV Mobilization & Demonstration Test | 2/1/94 | 6/30/94 |
| Prepare Draft PSTDCOP | 10/1/93 | 2/28/94 |
| GE Review/BEI Revise & Submit Draft PSTDCOP | 3/1/94 | 3/31/94 |
| Draft PSTDCOP Deadline | 4/1/94 | 4/1/94 |
| Pilot Testing of Deep Soil Stabilization | 4/1/94 | 4/15/94 |
| Prepare Draft FSTDCOP | 4/1/94 | 5/31/94 |
| GE Review/BEI Revise & Submit Draft FSTDCOP | 6/1/94 | 6/30/94 |
| Draft FSTDCOP Deadline | 7/1/94 | 7/1/94 |
| Revise/Submit FSTDCOP to WDOE | 8/17/94 | 9/15/94 |
| FSTDCOP Deadline - Estimated | 9/15/94 | 9/15/94 |
| Cleanup Action | 9/16/94 | 1/3/95 |
| Winter Delay | 1/4/95 | 2/2/95 |
| Re-mobilization and Finish Cleanup | 2/3/95 | 9/19/95 |
| Draft CAR | 5/3/95 | 8/2/95 |
| GE Review/BEI Revise & Submit CAR | 8/3/95 | 9/15/95 |
| Draft CAR Deadline | 10/1/95 | 10/1/95 |
| Revise/Submit Final CAR to WDOE | 11/17/95 | 1/2/96 |
| Final CAR Deadline - Estimated | 1/1/96 | 1/1/96 |




Project: Insitu Demo & Remedial Design
Date: 12/29/93

Critical | Progress | Summary | Estimated Milestone
Noncritical | Milestone | Rolled Up

## EXPLANATION

GWCMR = Ground-Water Compliance Monitoring Report

PSTDCOP = Preliminary Soil Treatment Design, Construction and Operation Plan

FSTDCOP = Final Soil Treatment Design, Construction and Operation Plan

CAR = Cleanup Action Report

**Bechtel**
SAN FRANCISCO

GENERAL ELECTRIC/SPOKANE

**PROJECT SCHEDULE**

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 4-1 | D |

GESP012da/RD_RA WP/SCAPR/SCAPR-021-D
12/30/93

SOIL TREATMENT PLAN

GE-SPOKANE REMEDIAL DESIGN/REMEDIAL ACTION PROJECT

# SOIL TREATMENT PLAN

Prepared for

GENERAL ELECTRIC COMPANY

by

BECHTEL ENVIRONMENTAL, INC.

San Francisco, California

December 1993

## TABLE OF CONTENTS

## TABLE OF CONTENTS (cont'd)

## Section 1

## INTRODUCTION

This Soil Treatment Plan was prepared by Bechtel Environmental, Inc. (Bechtel), for General Electric Company (GE) as one of the Project Plans for the GE-Spokane Remedial Design/Remedial Action (RD/RA) Project, as required under the *Consent Decree (WDOE, 1993a)* between GE and the Washington Department of Ecology (WDOE). The purpose of this Soil Treatment Plan is to present the conceptual plan developed for the soil cleanup action at the GE-Spokane site.

The remainder of Section 1 describes the project background, summarizes the proposed cleanup action, and discusses applicable regulations. Section 2 briefly summarizes prior activities associated with soils at the site and describes current site conditions. Section 3 summarizes the areas and volumes of soil to be treated. The conceptual cleanup action plan is presented in Section 4 and design activities to be conducted in preparation for the cleanup are discussed in Section 5. Section 6 describes implementation of the cleanup action activities. The schedule for the soil cleanup is given in Section 7 and the references cited in this plan are presented in Section 8. Table 1-1 provides a cross-reference indicating where the Consent Decree requirements are addressed in this plan.

### 1.1 Project Background

GE operated an apparatus service shop at East 4323 Mission Avenue in Spokane, Washington, during the period 1961 to 1980 (see Section 2 of the Summary Cleanup Action Planning Report for more information regarding the service shop). Figure 1-1 shows the project site location and Figure 1-2 shows the site layout, including the former facilities, as existed in 1989. Existing site surface features are shown in Figure 1-3.

In 1985, polychlorinated biphenyls (PCBs) were detected in site soils. GE subsequently performed Phase 1, 2, and 3 investigations of PCBs and other constituents in soil and ground water. More information about these investigations is presented in *Bechtel, 1986a; Bechtel, 1986b; Bechtel, 1987*; and *Golder, 1988*.

In 1989, the site was placed on the National Priorities List (NPL), by the U. S. Environmental Protection Agency (U.S. EPA). Therefore, the site investigations and cleanup are subject to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the Superfund Amendments and Reauthorization Act (SARA). The site is also subject to the State of Washington Model Toxics Control Act (MTCA). The U.S. EPA designated Washington Department of Ecology (WDOE) as the lead regulatory agency for this site.

The area designated as the NPL site includes the GE property and adjacent properties owned by Washington Water Power and Mr. Marvin E. Riley, doing business as Federal Construction Company. Following the change to NPL status, GE entered into an Agreed Order with WDOE. Under the terms of the Agreed Order, GE subsequently performed a two-phase remedial investigation (Phase 4 for soils and other solid materials and Phase 5 for ground water) and a baseline risk assessment (see *Bechtel, 1991a; Everest, 1992;* and *Golder, 1992*).

The remedial investigations indicated that PCBs were present in surface soils, in sediments in sumps and other underground structures, and in soils beneath these structures, including the West Dry Well where steam cleaning effluent was discharged during operation of GE's service shop. Concentrations of PCBs were also detected in ground-water samples collected from wells downgradient of the West Dry Well. Petroleum hydrocarbons, metals and volatile organic compounds (VOCs) were also detected in some soil or ground-water samples. The extent of residual chemicals is described in more detail in Section 2 of the Summary Cleanup Action Planning Report.

During the Phase 4 Remedial Investigation, GE conducted some interim actions, including demolition of the site building and excavation of underground structures and associated soils. These activities are described in the reference *Bechtel, 1991a*.

Since about 1986, GE has been exploring the possible use of in situ vitrification (ISV) for treating the soils containing PCBs at the site. The ISV technology, which is a thermal treatment/immobilization process, is described further in Section 4. In order to use this technology for treatment of PCB-containing soils at the GE-Spokane site, a Toxic Substances Control Act (TSCA) - required demonstration test must be performed so that the vendor of the technology, Geosafe Corporation (Geosafe), may obtain a TSCA permit for "disposal" of PCBs.

It was planned to conduct the ISV Demonstration Test at the GE-Spokane site in 1991. Shallow soils previously identified as PCB-containing were excavated and placed in five test cells along with soils spiked with imported PCBs and other materials removed during the interim actions described above. The preparations for the ISV Demonstration Test are described more completely in the reference *Bechtel, 1991b*. The planned demonstration test was delayed due to a mishap which occurred during an Operational Acceptance Test of the ISV equipment conducted by Geosafe at its Richland, Washington test site.

Under TSCA, a certificate of disposal must be provided within one year from the date when PCBs are "taken out of service" or removed from their original location. The PCB-spiked soils in one of the ISV test cells are subject to this requirement. The TSCA Section of U.S. EPA Region X was notified that, due to the delay in the planned ISV Demonstration Test, the spiked soils might remain in place for more than one year. U.S. EPA Region X granted an extension of the disposal certification requirement, with the provision that a plan and schedule for properly disposing of the materials "taken out of service" be submitted by October 1, 1993. A temporary cap was placed over the test cells in November 1991 to prevent infiltration of precipitation into the test cells and periodic site maintenance and inspections have been conducted since that time. The current schedule provided by Geosafe indicates the ISV Demonstration Test may be performed in early 1994.

After completion of the remedial investigations, GE conducted a feasibility study to evaluate remedial alternatives for soil and ground water (*Bechtel, 1992*). The feasibility study concluded that in situ vitrification would be the preferred cleanup action for soils, and institutional controls coupled with ground-water monitoring would be the preferred action for ground water. Contingent remedies were also identified in the feasibility study, for implementation in the event that ISV is not successfully demonstrated or ground-water monitoring and institutional controls are found to be ineffective. The contingent remedies are dechlorination for the soils; and extraction, treatment and discharge to a publicly-owned treatment works for the ground water.

In March 1993, WDOE issued a Cleanup Action Plan for the site *(WDOE, 1993a)*. The Cleanup Action Plan specifies PCBs and petroleum hydrocarbons as indicator chemicals for site cleanup and specifies the following cleanup levels:

| Medium | PCBs | Petroleum Hydrocarbons |
|---|---|---|
| Shallow Soils (≤ 15 ft deep) | 10 mg/kg | 200 mg/kg |
| Deep Soils (> 15 ft deep) | 60 mg/kg | 200 mg/kg |
| Ground Water | 0.1 µg/L | not applicable |

The Cleanup Action Plan specifies that the cleanup action for soils is treatment by vitrification and that the cleanup action for ground water is compliance monitoring and institutional controls; which are the preferred remedies identified in the feasibility study. The Cleanup Action Plan also specifies the same contingent remedies identified in the feasibility study. In-situ stabilization of some of the deep soils (grouting of soils below the West Dry Well from about 30 feet below ground surface to about 10 feet into the saturated zone) will also be performed because it is unlikely that the ISV technology will be sufficiently developed for treatment of soils at such depths.

The Consent Decree between GE and WDOE *(WDOE, 1993b)* outlines GE's responsibilities in performing the cleanup, including a specific scope and schedule of activities and deliverables. This document is a required deliverable under the Consent Decree.

## 1.2 Soil Treatment Summary

The Summary Cleanup Action Planning Report describes the overall RD/RA project. This Soil Treatment Plan describes the design, construction, and operational activities associated with the soil cleanup at the GE-Spokane site. The soil cleanup concept is briefly summarized as follows:

- In the West Dry Well area, the top 30 feet of soils containing chemicals above the cleanup levels will be excavated and treated by vitrification. The soils below 30 feet containing chemicals above the cleanup levels will be grouted in-situ. Grouting these soils is currently planned because in situ vitrification of soils at these depths does not appear feasible within the time frame permitted for soil cleanup.

- In the remainder of the site, the shallow and deep soils with chemical concentrations above cleanup levels will be excavated and treated by vitrification.

If vitrification of the shallow soils cannot be demonstrated successfully or cannot be made available by January 1, 1995, the shallow soils will be treated by the contingent remedy (dechlorination), instead of vitrification.

## 1.3 Applicable Environmental Regulations

Soil cleanup at the site must be performed in accordance with the applicable or relevant and appropriate requirements (ARARs). The *Feasibility Study Report* (*Bechtel, 1992*) describes the ARARs which include local regulations, CERCLA/SARA regulations, and the *MTCA Cleanup Regulations, Washington Administrative Code (WAC) Chapter 173-340 (WDOE, 1990)*. Pertinent WAC requirements include the following:

| | |
|---|---|
| WAC 173-340-400 | Cleanup Actions |
| WAC 173-340-410 | Compliance Monitoring Requirements |
| WAC 173-340-810 | Worker Safety |
| WAC 173-340-850 | Record Keeping |

During the soil cleanup action design, up-to-date local regulations will be reviewed to determine if they are more stringent than the ARARs compiled earlier; the regulations with more stringent requirements will be adopted for design and implementation of the soil cleanup action. If changes in the cleanup action are required due to more stringent local regulations, such changes will be brought to the attention of WDOE before they are adopted.

# Section 2

# PRIOR ACTIVITIES AND CURRENT SITE CONDITIONS

During the Phase 4 remedial investigation and the interim actions conducted in 1990, the former GE service shop was decommissioned by dismantling the equipment, demolishing the building, and excavating most of the underground structures, which were removed and disposed offsite. Additional activities conducted in 1990 consisted of excavation of a clean portion of the GE property to construct the five engineered subsurface ISV test cells and excavation of PCB-containing soils for filling the test cells. The PCB-containing soil, selected demolition debris and soil-filled drums were placed in the test cells for a planned demonstration test of the in situ vitrification technology. These excavation areas were then backfilled to the present, relatively flat, site grade. This section presents the extent of prior excavation, the ISV test cell configuration, the nature and thickness of the backfill materials which cover portions of the site, and the current conditions at the site.

## 2.1 Prior Excavation

Localized areas of the site were excavated during the Phase 4 remedial investigation (RI 4) and interim actions taken to remove underground structures (sumps, pit, dry wells and tanks) to facilitate further site characterization. The excavations were backfilled with clean imported sand. Excavation and sampling locations associated with these structures are presented in the *Report of Phase 4 Remedial Investigation and Interim Actions* (*Bechtel, 1991a*). Figure 1-2 also shows the locations of these underground structures. Shallow pits and trenches were also excavated for sampling purposes during the first two phases of remedial investigation (*Bechtel, 1986a* and *Bechtel, 1987*).

Figure 2-1 shows the approximate limits of the two areas excavated in preparation for the ISV Demonstration Test. The ISV test cell area was excavated first, in an area thought to contain clean soils, and the soils were mechanically screened to separate the "cobble" (material longer than one-inch) from the "volume reduction fines" (material smaller than one-inch). The cobble and volume reduction fines were stockpiled separately for subsequent use as backfill. The ISV test cell excavation was 19 feet deep.

The larger excavation was made to obtain sufficient PCB-containing soil to place in the five ISV test cells. This material was also screened to separate the cobble and fines. The depth of excavation varied from about two feet to approximately 12 feet. In some areas this excavation was not terminated in clean soils.

## 2.2 ISV Test Cell Construction

As previously mentioned, five ISV test cells were constructed at the site. Sand bags, imported cobble, and prefabricated concrete walls were used to form the outer boundaries of the cells as illustrated in Figures 2-2 and 2-3, which present the ISV test cells in plan view and in profile, respectively. There are no partitions between the individual cells, each of which measures 26-feet long by 26-feet wide by 17-feet deep (interior dimensions). The cells are covered with two feet of clean backfill. The test cell area occupies about 0.1 acre of the GE property. The test cell excavation boundary (Figure 2-2) at the ground surface encompasses about 1/4 acre.

The PCB-containing volume reduction fines constitute the bulk of the material placed in the five test cells. Other materials, including pieces of asphalt and concrete and seventy-eight 55-gallon drums of soil, were placed in various cells for the purpose of demonstrating that these materials could be successfully vitrified. Three 12-inch thick layers of PCB-spiked (concentration approximately 10,000 mg/kg) sand were placed in Test Cell 2 to demonstrate an ISV destruction and removal efficiency equivalent to incineration of PCBs. Figure 2-4 indicates the contents of each ISV test cell. A more detailed description of the ISV Demonstration Test preparation activities may be found in the *ISV Demonstration Test Preparation Activities Report (Bechtel, 1991b)*. As previously mentioned, the ISV Demonstration Test was postponed following a mishap that occurred during the second operational acceptance test conducted by Geosafe at its Richland test site in March 1991.

## 2.3 Backfill Areas and Materials

The cobble from the onsite screening operation was used to backfill most of the area excavated to provide PCB-containing soils for the test cells. The cobble was determined to be clean as indicated in the *Feasibility Study Report* (*Bechtel, 1992*). The lateral extent of the area covered with cobble is indicated in Figure 2-1.

The volume reduction fines from excavation of the ISV test cell area were thought to contain low, if any, concentrations of PCBs. This material was used as shallow backfill in several areas of the site and also to backfill the perimeter (sloped) area of the ISV test cell excavation. Samples of the volume reduction fines placed as shallow backfill were later analyzed at offsite laboratories and some of the samples were found to contain PCBs at concentrations above the 10 mg/kg cleanup level for shallow soils. These materials may overlap or intermingle with the cobble, especially at the interface below the ground surface because of the irregular excavation boundaries. Where exposed at the ground surface, the volume reduction fines were temporarily covered with a layer of clean imported fill approximately three inches thick.

## 2.4 Current Site Conditions

Currently, the GE and WWP portions of the site are entirely fenced and the gates are kept locked. Access to the Riley property from Mission Avenue is permitted through the asphalt-covered roadway from Havana Street. Except for the WWP power transmission poles, there are no surface structures on the GE or WWP properties. Mr. Riley's property has several commercial buildings, but is currently unoccupied.

In late 1991, the ISV test cell area was covered with plastic sheeting over which several inches of gravel was placed and graded to prevent surface water run-on. This temporary cap is inspected periodically. A security service patrols the site several times a day to ensure that the site remains physically secure. Existing site surface features are shown in Figure 1-3.

## Section 3

## AREAS AND VOLUMES TO BE TREATED

This section describes the lateral and vertical extent of soils containing chemicals above cleanup levels. The West Dry Well area, which has both shallow and deep chemical-containing soils, is discussed separately, then the remaining areas are discussed. The areas and volumes of soil to be treated are described below and are summarized in Table 3-1.

### 3.1 West Dry Well Area

Figure 3-1 shows the locations of two subsurface profiles through the West Dry Well area. The PCBs in the West Dry Well area soils extend to the ground-water table at a depth of approximately 65 feet below ground surface. The extent of the PCBs narrows with depth as indicated in Figure 3-2. At the ground surface, the approximate lateral extent of PCB-containing soils may be represented by an approximately elliptical area 30 feet in diameter.

The distribution of TPH-containing soils in the West Dry Well area roughly coincides with that of PCBs, with perhaps a somewhat larger areal extent at the ground surface but narrower at depth. TPH does not extend to the ground-water table, as indicated in Figure 3-3.

Approximately 144 cubic yards of shallow soil (less than or equal to 15 feet deep) and 211 cubic yards of deep soil (15 to 65 feet deep) in the West Dry Well area will need to be treated.

## 3.2 Other Areas

Figure 3-4 shows the other areas (except for the volume reduction fines), of soils requiring treatment. These areas are keyed to the volume and depth estimates in Table 3-1. Sample analytical results from the bottoms and walls in these previously excavated areas, along with knowledge of the typical distribution of chemicals observed in the remedial investigations, were used to estimate the depths and volumes of chemical-containing soils. It should be noted that the estimated volume of soil to be treated does not represent the total volume of soil that will need to be handled during cleanup, as several feet of clean backfill overlie the chemical-containing soil in several of these areas.

### 3.2.1 Shallow Soils

Six localized areas associated with underground structures contain shallow soils with PCBs above cleanup levels. These are: Sump S1, North Sump, Unknown Sump, Small Transformer Oil Storage Tank, Large Transformer Oil Storage Tank, and the West Dry Well (extent and volume discussed above). TPH above the cleanup level is known to be present only in sludge in the Unknown Sump, although it may also be present in soils which were not previously tested for TPH. These six localized areas contain a total of approximately 829 cubic yards of shallow soil above cleanup levels.

In addition to the above areas, there are seven numbered (see Table 3-1 and Figure 3-4) subsurface areas where PCBs above the cleanup level remain after excavating soils for placement in the ISV test cells. Figure 3-5 presents profiles of the shallow subsurface soils to be treated. These profiles show clean backfill (primarily cobble) overlying, at various depths, the soils requiring treatment. The seven numbered subsurface areas contain a total of approximately 2,015 cubic yards of shallow soil above the cleanup levels.

### 3.2.2 Deep Soils

The former Large Transformer Oil Storage Tank area, located adjacent to the West Dry Well (Figure 3-4), is the only area onsite, besides the West Dry Well area, containing chemicals above the cleanup levels in deep soils. This area is believed to contain approximately 111 cubic yards of deep soil above the PCB cleanup level, based on the results of samples collected in this area during the Phase 4 Remedial Investigation.

### 3.2.3 Volume Reduction Fines

Figure 2-1 indicates areas of the site where volume reduction fines were used as backfill following preparation of the ISV test cells, as described in Section 2.3. This material, previously thought to be clean (i.e., containing no or very low concentrations of PCBs), was placed in the ISV test cell excavation, exterior to the perimeter sand bag walls. Approximately 2,850 cubic yards (2,550 cubic yards to 15 feet deep and 300 cubic yards from 15 to 21 feet deep) of this material are located in this area below a plastic liner and clean gravel cover. These soils have not been tested, so they are assumed to be above cleanup levels for this Soil Treatment Plan. Sampling and analysis of these soils will be conducted as part of the soil cleanup action design. Approximately 446 cubic yards of the volume reduction fine were used as shallow fill in three other areas of the site. Some samples of this material contained greater than 10 mg/kg PCBs, so treatment will be required.

## Section 4

## CONCEPTUAL CLEANUP ACTION PLAN

In general, the soil cleanup action will consist of excavation, screening, and vitrification of the majority of the soils and in-situ stabilization (grouting) of the West Dry Well area soils below a depth of 30 feet. These activities are described in more detail in the following subsections.

### 4.1 West Dry Well Grouting

The grouting will involve placing a cylindrical barrier of interlocking, grouted soil columns around the sides and base of the chemical-containing soils. A primary barrier will be placed first in the clean soil surrounding the chemical-containing zone. After the primary barrier is completed, the secondary barrier, representing the outer extent of chemical-containing soils, will be placed. The grouted columns will be overlapping such that all of the soil between the columns is incorporated in the grouted mixture. The result will be a stabilized mass of chemical-containing soil surrounded by a low-permeability barrier. The total treated mass of material will be about 30 feet in diameter and about 35 feet in vertical thickness. A schematic of the grouting concept is shown in Figure 4-1.

The grouting will likely be performed by injecting a cementitious grout into the subsurface with a specially equipped drilling rig. The final grouting method will be determined after the grouting pilot test, which is described in Section 5.2.

To ensure that all the chemical-containing soil has been successfully grouted, a series of boreholes will be drilled just outside of the grouted area and soil samples will be collected from regular intervals, as discussed in the Compliance Monitoring Plan. If the grouted areas do not meet the cleanup levels (i.e. all the soils above cleanup levels are surrounded by grout), the areas will be regrouted as necessary and retested.

## 4.2 West Dry Well Excavation

The upper 30 feet of soil in the West Dry Well area will be excavated, screened, and stockpiled as described in Section 4.3. All materials, including the dry well structure, will be removed and the resulting excavation will be sampled and analyzed. The materials removed will be stockpiled, then placed in the onsite treatment cells and vitrified, as described in Section 4.5.

The sides of the West Dry Well area excavation will be shored and may be ramped for access from one side. The excavation method will be finalized during the cleanup action design.

## 4.3 Excavation, Screening and Stockpiling

The remaining areas of chemical-containing soils will be excavated as shown in the conceptual excavation plan, Figure 4-2, and as described below. First, the previously placed volume reduction fines from the ISV Demonstration Test cell excavation will be scraped up and stockpiled. Clean backfill overlying the soils containing chemicals will then be excavated and stockpiled in a clean area. Excavation of the chemical-containing soils will proceed in stages, as described in Section 6. Excavation boundaries will be sampled and analyzed to determine the distribution of chemicals. Additional excavation will be conducted in areas where soil samples indicate cleanup levels have not been met. The final sample locations and excavation boundaries will be surveyed before backfilling.

Excavated chemical-containing soil will be mechanically screened to separate the cobble (material greater than 1 inch in size). A mobile screening unit with a five - to eight-yard bucket capacity may be used. The cobble will be analyzed to verify the absence of PCBs and TPH above the cleanup levels. Cobbles found to contain concentrations in excess of the cleanup levels will either be vitrified or subjected to a washing process to reduce the chemical concentrations. Clean cobble, cobble containing chemicals, if any, and soils containing chemicals will be stockpiled separately.

During excavation, screening and stockpiling, the vitrification cell complex will be prepared in the ISV Demonstration Test cell area, as shown in Figure 4-3 and described in Section 4.5.

A total of approximately 12,000 cubic yards of soil will be excavated. This total includes approximately 6,500 cubic yards of soil with chemical concentrations above cleanup levels and approximately 5,500 cubic yards of clean backfill. Of the 6,500 cubic yards, approximately 4,900 cubic yards of the screened fines will require treatment.

## 4.4 Backfill of Excavations and Vitrified Areas

All spot excavations will be backfilled with clean site materials. If insufficient clean material is available at the site, these excavations will be raised to final grade using imported certified clean fill. Since vitrification will decrease the soil volume by 20 to 40 percent, approximately 2,000 cubic yards of clean fill may need to be imported to restore the site to approximate original grade. The imported fill materials will be compacted and graded to promote runoff.

## 4.5 Staging and Vitrification

The vitrification, which is described below, will take place in a complex of approximately 13 cells over the ISV Demonstration Test cell area. The subsidence depression remaining in the ISV Demonstration Test cell area after the demonstration test will be used to stage soils for vitrification. The depression will be filled to the ground surface with soil to be treated, and additional soil will be staged above ground surface to achieve a total thickness of approximately 15 feet. The above-ground portion of the soil will be contained with a berm constructed of clean soil. The soil will be staged in the cells with minimum compaction effort.

The materials in each cell will then be vitrified as described below. The conceptual site layout for vitrification is shown in Figure 4-3. The final number, configuration and location of the cells will be based on the final quantities of soil to be treated, Geosafe's recommendations, and physical site restrictions.

The ISV technology is a thermal treatment/immobilization process whereby electrical heating melts the chemical-containing soil, resulting in a chemically inert and stable glass and crystalline product. First, a conductive graphite and glass frit starter mixture is placed on the soil surface, and an electric potential is applied between two pairs of electrodes, causing current to flow through the starter path. The adjacent soils are heated to melting temperature (above 1600°C) and the melting front advances downward and outward, encompassing the desired soil volume. The organic components in the soil are vaporized and pyrolyzed into elementary gaseous components. The inorganic components are fixed (immobilized) in the melted soil. The off-gases are collected by a hood covering the surface of the melt zone and are treated to remove residual chemicals and particulate matter. A schematic of the ISV process is provided in Figure 4-4.

The primary equipment items needed for the ISV process are the moveable hood and associated off-gas piping, the off-gas processing trailer system, the electrical-trailer, and the support trailer. Associated equipment include a crane for moving the hood from setting to setting and a front-end loader and a grader to backfill subsidence zones after melts are completed.

In preparation for vitrification of site soils, the ISV support facilities, including the three trailers, will be set up onsite. The support facilities may be located at one central location for the duration of the vitrification activities.

Clean fill will be used to provide a level surface around each cell for placement of the ISV hood. The hood will then be placed over the cell with the crane and the electrodes will be placed on the soil surface through the hood openings. Then, the electrodes will be connected to the electrical power source, and the off-gas hood to the off-gas treatment facilities. After completion of the melt, the hood will be moved to a temporary location so that the subsidence zone can be backfilled with clean fill and surface preparations can be made at the next cell. This process will continue until all cells have been vitrified and the last subsidence zone has been backfilled.

### 4.6 Storm Water Management

During soil cleanup water from rain or snowmelt ("storm water") will be managed by diverting runoff away from the areas where chemical-containing materials are handled using berms and ditches. Stormwater will be collected from excavations and other areas as needed by sloping these areas to geomembrane-lined sumps and pumping water for treatment and disposal. After backfilling the excavations and vitrification subsidence zones, the site will be graded to promote effective runoff and minimize the potential for erosion.

Storm water will be collected and treated as described in Section 3.4 of the Investigative and Project Waste Management Plan.

### 4.7 Dust Control

Dust control measures will be implemented during cleanup activities to prevent airborne emissions of soil containing chemicals. These measures will include spraying water on excavations, haul roads, backfill and stockpile surfaces, and placing a temporary synthetic liner over stockpiles. Airborne emissions will be monitored in accordance with Section 6 of the Health and Safety Plan.

## Section 5

## SOIL CLEANUP DESIGN ACTIVITIES

This section provides a description of the design activities to be conducted, and the design deliverables to be submitted, prior to cleanup implementation. The design deliverables include the Preliminary and Final Soil Treatment, Design, Construction and Operation Plans, which are required submittals under the Consent Decree.

During the preliminary design, the ISV Demonstration Test and the grouting pilot test will be performed as treatability tests, and excavation, screening and stockpiling processes will be evaluated. Preferred technologies and processes will be selected. Estimates of areas and volumes of soils to be treated will be refined based on the results of additional sampling and analysis. The results of the grouting pilot test and ISV Demonstration Test and additional sampling will be incorporated in the Preliminary Soil Treatment Design Construction and Operation Plan. These evaluations and tests will provide the basis for developing the Final Soil Treatment Design, Construction and Operation Plan.

### 5.1 ISV Demonstration Test

As previously mentioned, GE is planning to conduct a demonstration test of the in situ vitrification technology at the Spokane site as a treatability test for remedial design. The ISV process is described in Section 4.5.

The ISV Demonstration Test will consist of processing five previously constructed subsurface treatment cells composed of chemical-containing materials, including three test layers of soils spiked to a concentration of about 10,000 mg/kg PCBs. The construction of the test cells was described in Section 2.2. The present ISV test cell configuration is shown in plan view and cross-section in Figures 2-2 and 2-3, respectively.

Modifications of the test cells will be needed before conducting the demonstration test to conform with Geosafe's new requirements resulting from evaluation of the previous operational acceptance tests. Prior to performing these modifications, the clean gravel cover (and plastic sheeting) will be removed with a grader and front-end loader and will be stockpiled in a clean area of the site. The 2-foot layer of clean sand will also be removed and stockpiled in a similar manner. The test cell modifications will consist of: 1) rupturing each of the seventy-eight 55-gallon soil-filled, sealed drums at the bottom of four test cells by vibratory driving a steel I-beam through each drum; 2) making several vertical openings in selected test cell walls by vibratory driving or pile driving; 3) removing two feet of PCB-containing soil from the top of the test cells to reduce the ISV melt depth; and 4) removing the cobble, sand bags and slope backfill from a portion of the north wall of cell 2 and replacing them with clean fill. Soil excavated from the top of the test cells will be transported to the TSCA-permitted disposal facility at Arlington, Oregon. A one-foot layer of clean soil will then be replaced over the test cells prior to vitrification, to create a final cell depth of 16 feet. The test cell modifications are described in the *Amendment to the Demonstration Test Plan (Geosafe, 1993).*

Geosafe's equipment and support trailers will be brought to the site for the test, which is expected to last about ten weeks. Prior to starting vitrification, the four 16-inch diameter PVC electrode casings will be removed from the test cells. As each cell is vitrified, the cell will be backfilled with clean soil and the hood will be moved to the next cell. This process will continue until the five cells have been vitrified and the last subsidence zone has been backfilled.

Monitoring for soil-gas pressure changes during the ISV Demonstration Test, which is intended to detect outward migration of gases from the melt, is required by WDOE as part of the compliance monitoring program. The proposed soil-gas monitoring program is described in the Soil-Gas Sampling and Analysis Plan, Part 3 of the Compliance Monitoring Plan.

## 5.2 Grouting Pilot Test

A pilot test will be performed to demonstrate the effectiveness of grouting as an immobilization technology for chemical-containing soils at depths greater than 30 feet in the West Dry Well area. The success of the technology will be demonstrated by verification that grouting has immobilized or encapsulated chemicals above cleanup levels. Details of the pilot test will be developed as part of the soil design and the general concept for the test is presented below.

The grouting pilot test will likely be performed on shallow soils in the West Dry Well area. Soil samples will be collected prior to the pilot test in order to establish baseline chemical concentrations and particle size gradation at the specific locations to be tested and the locations to be treated. During the pilot test, grout will be injected in a series of overlapping columns. Several grout formulations, column sizes, and spacing may be tested. The grouted material will be excavated as a unit and will be visually inspected to evaluate the quality and extent of cementation. Core samples of the grouted material will be obtained, extracted, and analyzed for the indicator chemicals.

The pilot test results will be incorporated into the Final Soil Treatment Design Construction and Operation Plan.

## 5.3 Preliminary Soil Treatment Design, Construction and Operation Plan

The Preliminary Soil Treatment Design, Construction, and Operation Plan will be at the 30 percent (or higher) design level and will include:

- Background information, including goals of the cleanup action and specific performance requirements, existing and expected site conditions, and location of the cleanup action;
- Characterization of the media affected, quantity of materials to be treated, and appropriate illustrations including maps and cross sections;

- Conceptual plan description, including planned actions, treatment units, processes, ancillary facilities and control features;

- Engineering justification for design and operation parameters, including general material specifications; design criteria, assumptions and calculations; expected treatment, destruction, or immobilization efficiencies; pilot or treatability data, results from similar operations, and literature evidence;

- Schedules, including copies of required permits or schedules to obtain permits, and schedule for final design and construction;

- Design of special features for the control of hazardous substance spills or discharges, including air emissions;

- Health and safety feature design, including monitoring devices;

- Facility-specific characteristics which may affect design, construction, or operation of the cleanup action;

- A general description of construction testing which will demonstrate adequate quality control and compliance with cleanup levels;

- Additional information, as needed, regarding health and safety, applicable state, federal, and local requirements, and property access issues, including references to applicable sections of the RD/RA Project Plans; and

- A site survey to define the existing topographical conditions at the site.

## 5.4 Final Soil Treatment Design, Construction and Operation Plan

The Final Soil Treatment Design, Construction and Operation Plan will contain sufficient information to meet the requirements listed in *Cleanup Actions, WAC 173-340-400 (WDOE, 1990).* It will incorporate WDOE comments on the Preliminary Soil Treatment Design, Construction and Operation Plan. Specific components of the Final Soil Treatment Design, Construction and Operation Plan will include:

- Summary of design criteria;

- Copies of permits and approvals;
- Detailed plans of equipment and site conditions;
- Equipment requirements and limitations;
- Material specifications;
- Construction impact mitigation plan; and
- Operation and maintenance plan.

This document will provide all the information necessary to solicit competitive bids for the cleanup action work.

## SECTION 6

## IMPLEMENTATION OF SOIL CLEANUP ACTIVITIES

This section describes implementation of the cleanup activities and related support activities, including the proposed cleanup sequence, and preparation of the Cleanup Action Report. A summary flow diagram for the soil cleanup activities is shown in Figure 6-1.

### 6.1 Preconstruction Site Survey

A preconstruction site survey will be conducted to mark excavations, laydown areas, work zones, stockpile areas, screening areas, and vitrification cells, and to identify restrictions at the site such as power lines and space limitations. The planned work zones are shown in Figure 6-2 and the construction plan is shown in Figure 6-3.

The survey will be coordinated with Washington Water Power and other utility companies to identify interferences with above ground and underground utilities. The survey marking will clarify potential problems associated with implementation of soil cleanup work to the bidders during the bid walk.

### 6.2 Mobilization for Excavation and Treatment

Mobilization will consist of moving to the site the materials and equipment necessary to perform the cleanup activities. Mobilization will include the following activities:

- Locating equipment, office trailers and all supporting facilities;
- Establishing 24-hour site security service;
- Obtaining all necessary excavation and utility permits; and

- Defining haul roads and obtaining permission to access adjacent properties.

### 6.3 Site Preparation

Site preparation will begin with scraping the PCB-containing volume reduction fines into a stockpile as indicated in Figures 4-2 and 6-3. Then, the exclusion, contamination reduction, and support zones as shown in Figure 6-2 will be laid out and cordoned off. Dust emissions control monitoring stations will be set up. The asphalt from the roadway will be removed and sent to an asphalt plant for recycling. Finally, a surface water runoff diversion system, which will consist of ditches, swales and berms, will be constructed to control runoff from areas of chemical-containing soils.

### 6.4 Soil Cleanup Sequence

The proposed sequence of soil cleanup activities is shown in Figure 6-1. First, the West Dry Well area soils below a depth of 30 feet will be grouted. Next, the clean backfill overlying the chemical-containing soils will be removed and stockpiled in designated areas in the support zone. Then, excavation of chemical-containing soil will begin. The conceptual excavation plan is shown in Figure 4-2 and the stockpile locations are shown in Figure 6-3.

Excavation will begin with removal of the "spot excavations" and the portion of excavation Area A on the Riley property. The excavated soil will be screened, the resulting chemical-containing volume reduction fines will be stockpiled within the exclusion zone, and the clean cobbles will be stockpiled within the support zone. The spot excavations will be backfilled with clean site backfill materials previously stockpiled.

Area B will be excavated next, the soils will be screened, and the chemical-containing volume reduction fines and the clean cobbles will be stockpiled as described above. When cleanup levels have been achieved, Area B will be backfilled with clean soil.

Next, the soils from Areas C and D will be excavated and screened. The ISV Demonstration Test cell area will be excavated and prepared as the vitrification cell complex concurrently with the Area C and D excavations. The chemical-containing volume reduction fines from Areas C and D will be placed directly into the cell complex as it is constructed.

The chemical-containing soils from the remainder of Area A will then be excavated, screened, and staged directly in the cell complex. Remaining stockpiled soils from the other excavations, if any, will be placed in the cell complex, and the cell complex will be closed.

Finally, the soils staged in the cell complex will be vitrified. After vitrification in all cells is completed, the site will be backfilled with imported clean soil and finish-graded to promote runoff. The equipment will be demobilized and the office trailers and supporting facilities will be removed from the site.

### 6.5 Cleanup Action Report

After completion of the soil cleanup action, the Cleanup Action Report will be prepared to document site activities and compliance with cleanup levels. The Cleanup Action Report will include:

- As-built drawings of the facility;
- A report documenting all aspects of facility construction;
- Compliance monitoring data and interpretation;
- A statement from the Project Engineer, based on testing results and inspections, as to whether the cleanup action was performed in substantial compliance with the plans and specifications and related documents;

- Certified copies of property deeds, documenting institutional controls in place; and
- Long-term site maintenance plan.

## SECTION 7

## SCHEDULE

The soil treatment schedule, showing each design and cleanup activity described in Sections 5 and 6, is provided in Figure 7-1. The estimated duration of the design and cleanup phases is approximately 24 months. The master project schedule is provided in Figure 4-1 of the Summary Cleanup Action Planning Report.

## Section 8

## REFERENCES


Bechtel National, Inc., 1986a, *Phase 1 Field Investigation, East 4323 Mission Avenue, Spokane, Washington*: Report to General Electric Company.

Bechtel National, Inc., 1986b, *Field Investigation Report, North Warehouse, Spokane, Washington*: Report to General Electric Company.

Bechtel National, Inc., 1987, *Phase 2 Field Investigation, East 4323 Mission Avenue, Spokane, Washington*: Report to General Electric Company.

Bechtel Environmental, Inc., 1991a, *Report of Phase 4 Remedial Investigation and Interim Actions at the former General Electric Spokane Facility:* Report to General Electric Company.

Bechtel Environmental, Inc., 1991b, *Report of In Situ Vitrification Demonstration Test Preparation Activities at the former General Electric Spokane Facility:* Report to General Electric Company.

Bechtel Environmental, Inc., 1992, *Feasibility Study Report for the former General Electric Facility, Spokane Washington:* Report to General Electric Company.

Everest Consulting Associates, 1992, *Baseline Risk Assessment: Mission Avenue Site:* Report to General Electric Company.

Geosafe, 1990, *TSCA Demonstration Test Plan In Situ Vitrification Hazardous Chemical Waste Destruction System*, March 1990.

Geosafe, 1993, *Amendment to TSCA Demonstration Test Plan In Situ Vitrification Hazardous Chemical Waste Destruction System*, September 1993.

Golder Associates, Inc., 1988, *Phase 3 Remedial Investigation, East 4323 Mission Avenue, Spokane, Washington*: Report to General Electric Company.

Golder Associates, Inc., 1992, *Phase 5 Remedial Investigation Report, East 4323 Mission Avenue, Spokane, Washington:* Report to General Electric Company.

Washington Department of Ecology 1990, *The Model Toxics Control Act Cleanup Regulation and Proposed Amendments:* Chapter 173-340, Washington Administrative Code (July 27, 1990).

Washington Department of Ecology, 1993a, *Final Cleanup Action Plan for the General Electric Spokane Site,* March 29, 1993.

Washington Department of Ecology, 1993b, *GE/Spokane Consent Decree,* August 25, 1993.

TABLES

# TABLES

**TABLE 1-1**

**CROSS-REFERENCE TO CONSENT DECREE REQUIREMENTS**

| *CONSENT DECREE REQUIREMENT* | *SECTION* |
|---|---|
| Description and conceptual design of treatment units and processes required to implement the cleanup action, including a summary flow diagram. | 4, Figure 6-1 |
| Maps depicting the characteristics, quantities, and locations of materials to be treated. | Figures 3-2 through 3-5 |
| Schedule for implementation of soil alternative(s). | Figure 7-1 |

## TABLE 3-1

## SUMMARY OF SOIL VOLUMES, DEPTHS AND PCB CONCENTRATIONS[a]

| *SITE AREA* | *ESTIMATED VERTICAL EXTENT (ft)* | *MAXIMUM PCB Concentration[b] (mg/kg)* | *ESTIMATED TREATMENT/ EXCAVATION VOLUME (cubic yards)* |
|---|---|---|---|
| <u>Shallow Soils</u> | | | |
| West Dry Well | 5-15 | 180 | 144 |
| Sump S1 | 3-10 | 250 | 84 |
| North Sump | 0-10 | 17 | 19 |
| Unknown Sump | 0-10 | >150 | 278 |
| Small TOST | 5-13 | 211 | 119 |
| Large TOST | 5-15 | 120 | 185 |
| Subsurface Area 1 | 1-4 | 420 | 964 |
| Subsurface Area 2 | 1-4 | 95 | 132 |
| Subsurface Area 3 | 5-10 | >140 (c) | 116 |
| Subsurface Area 4 | 6-9 | 29 | 25 |
| Subsurface Area 5 | 2-5 | 93 (c) | 167 |
| Subsurface Area 6 | 1-7 | 890 | 567 |
| Subsurface Area 7 | 3-6 | 63 | 44 |
| Reduction Fines | 0-0.5 | 56 | 446 |
| ISV Slope Backfill | 0-15 | (d) | 2550 |
| *Subtotal* | | | *5840* |

TABLE 3-1 (cont'd)

SUMMARY OF SOIL VOLUMES, DEPTHS AND PCB CONCENTRATIONS[a]

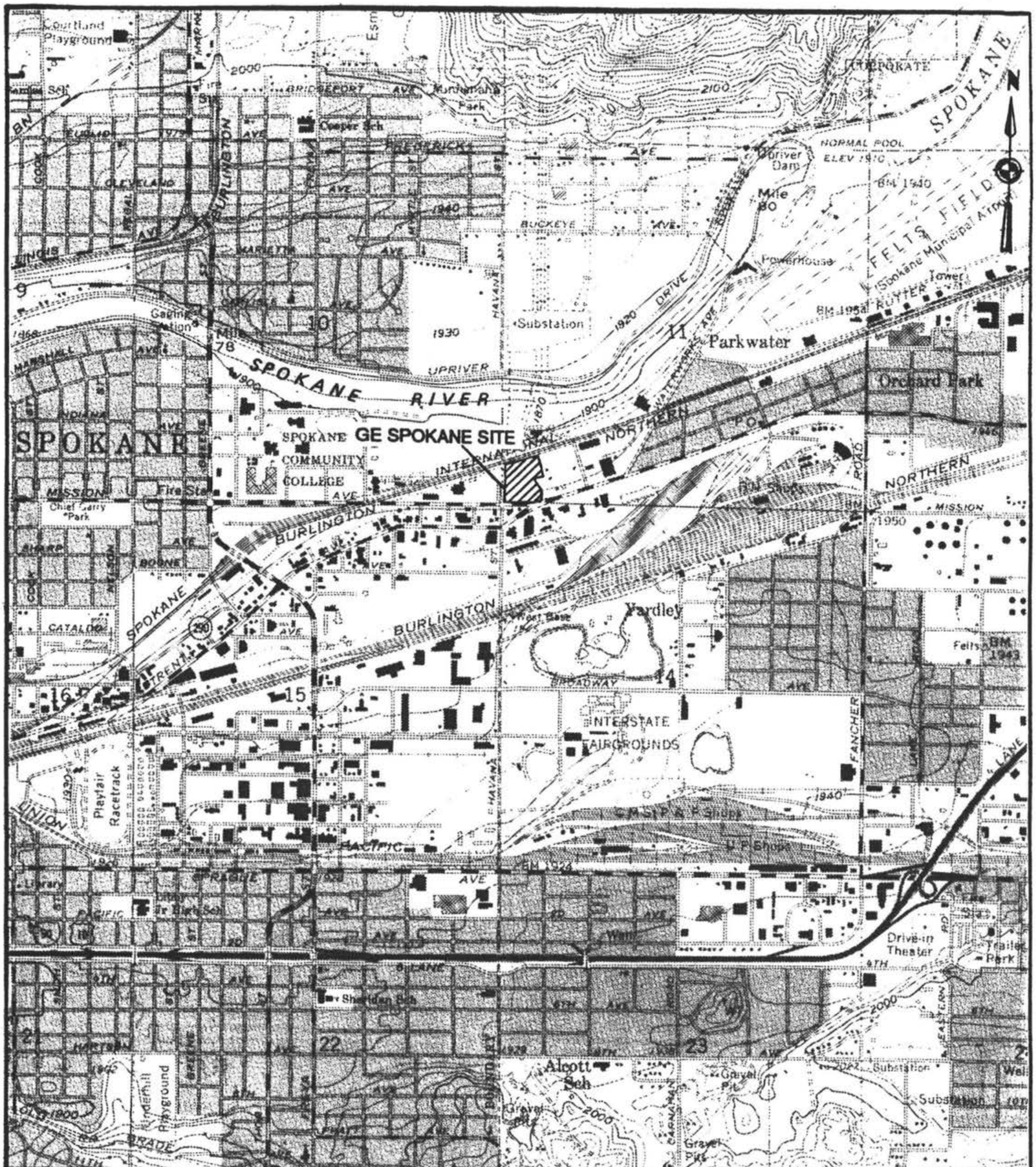
| *SITE AREA* | *ESTIMATED VERTICAL EXTENT (ft)* | *MAXIMUM PCB Concentration[b] (mg/kg)* | *ESTIMATED TREATMENT/ EXCAVATION VOLUME (cubic yards)* |
|---|---|---|---|
| Deep Soils | | | |
| West Dry Well | 15-55[e] | 21,000 | 211 |
| Large TOST | 15-21 | 120 | 111 |
| ISV Slope Backfill | 15-21 | (d) | 300 |
| *Subtotal* | | | *622* |
| ***Grand Total*** | | | ***6462*** |

Notes:

(a) Estimated volumes and vertical extents will be refined in the soil cleanup design. The information provided here is from the conceptual estimate in the *Feasibility Study Report (Bechtel, 1992).*
(b) Sum of Aroclors 1254 and 1260.
(c) Onsite analytical laboratory data.
(d) Concentration uncertain - not analyzed in-situ.
(e) The actual depth anticipated to be treated is 65 feet.

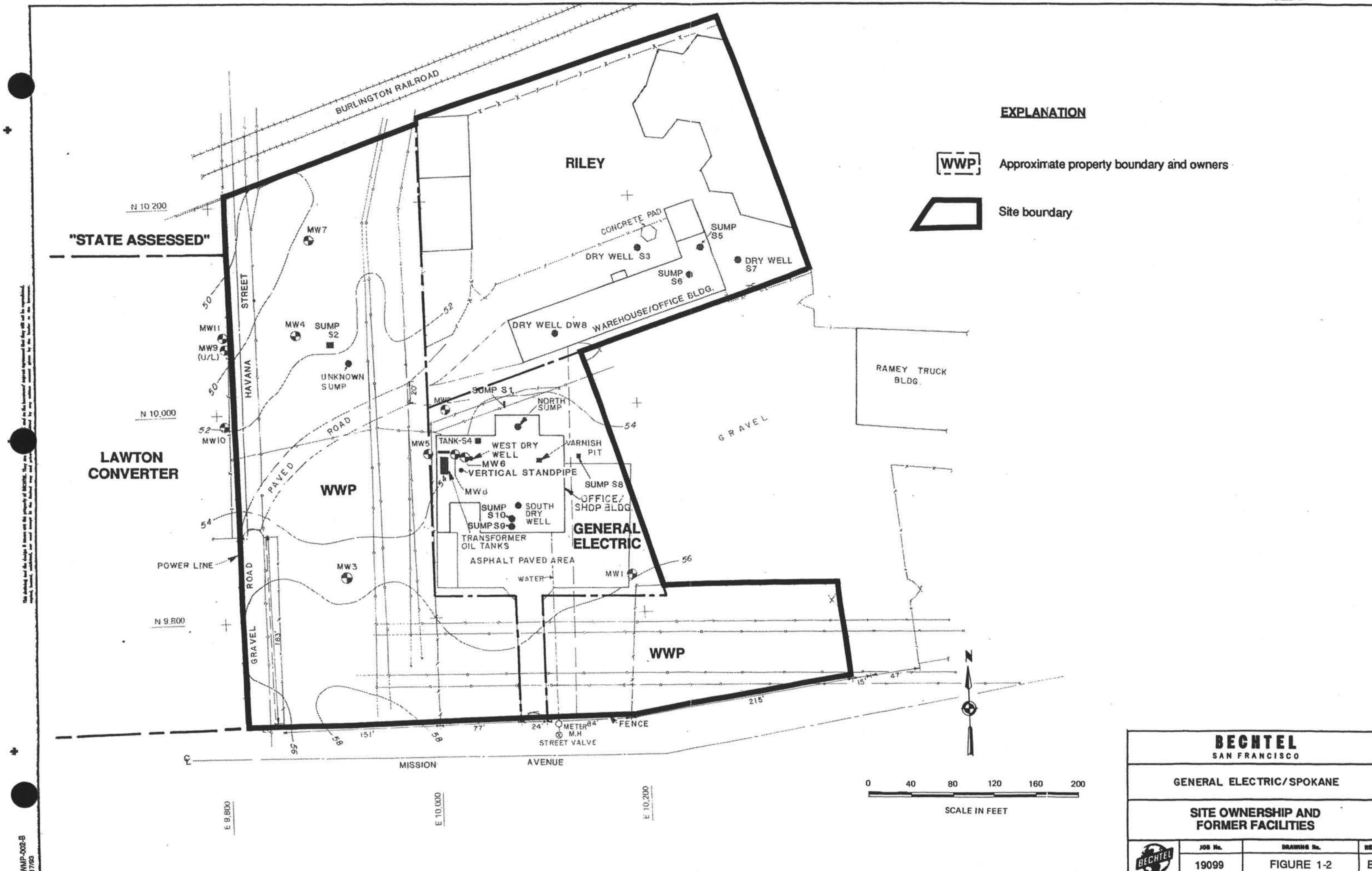
FIGURES

# FIGURES




| Bechtel SAN FRANCISCO | |
|---|---|
| GENERAL ELECTRIC/SPOKANE | |
| SITE LOCATION MAP | |
| Job Number | Drawing No. |
| 19099 | FIGURE 1-1 |

STP-001-A
5/11/93

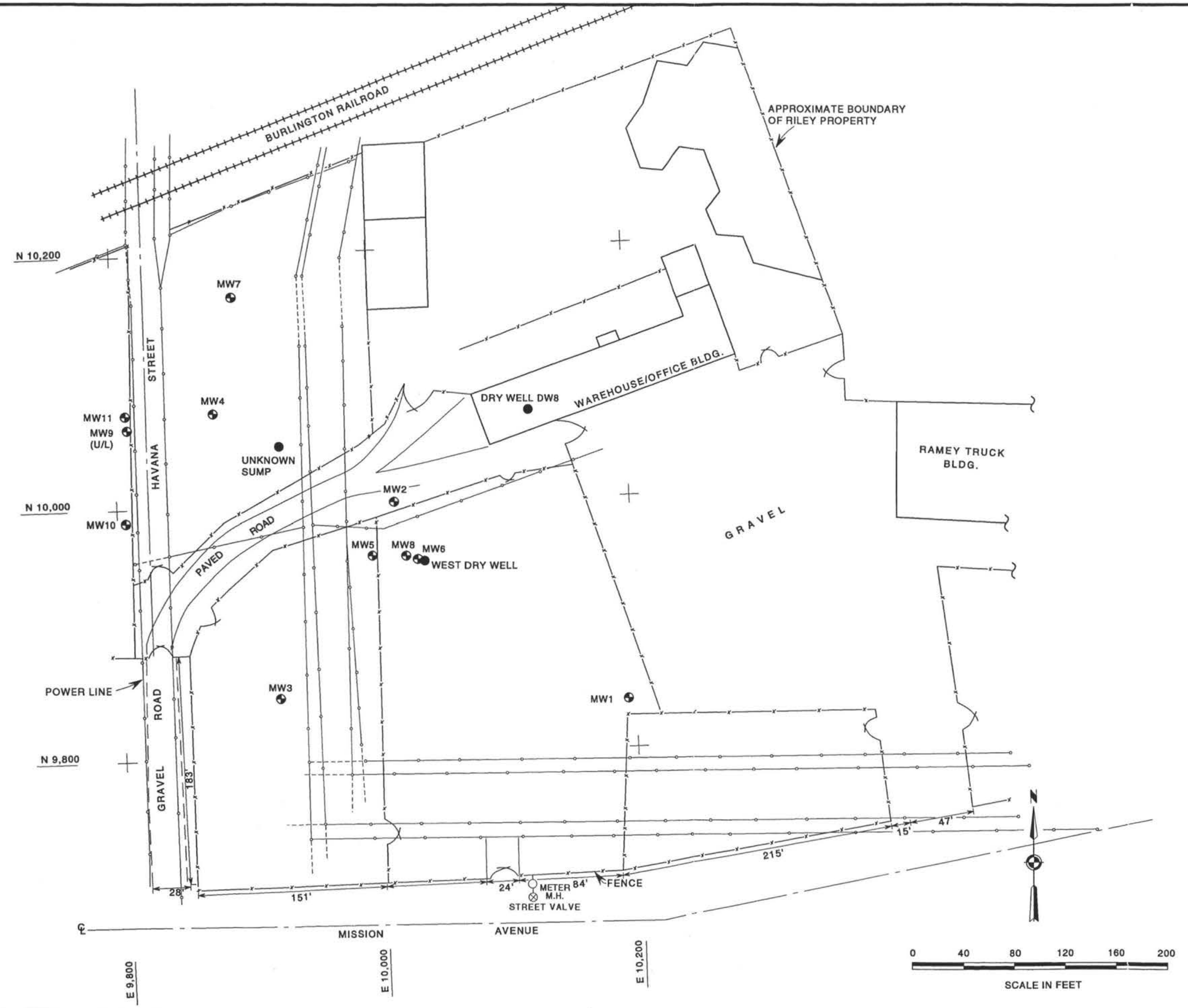



BECHTEL
SAN FRANCISCO

GENERAL ELECTRIC/SPOKANE

SITE OWNERSHIP AND FORMER FACILITIES

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 1-2 | B |




**Bechtel**
SAN FRANCISCO

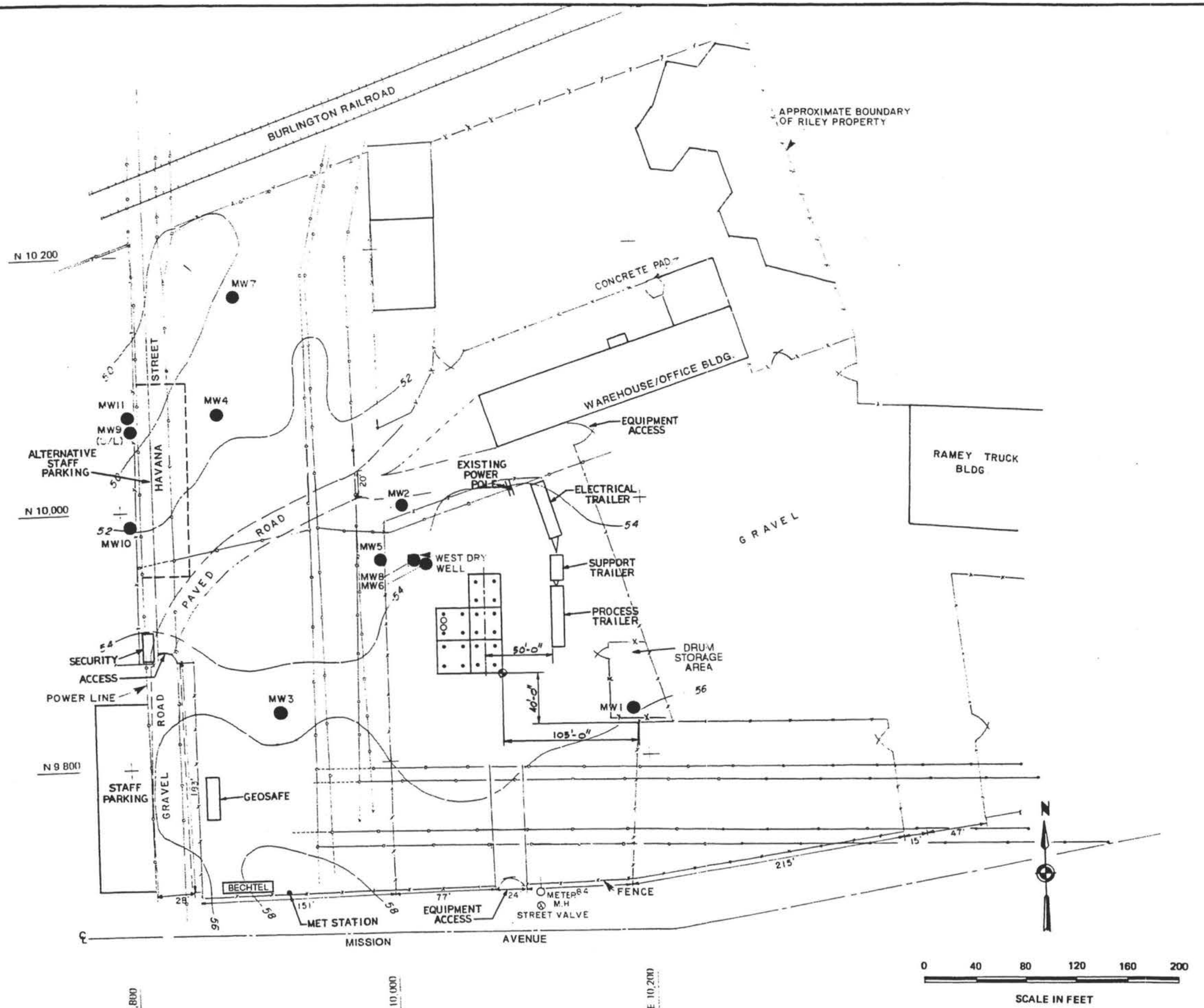
GENERAL ELECTRIC/SPOKANE

## EXISTING SITE FEATURES

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 1-3 | A |

GESP006de/RD_RA WP/IPWMP/IPWMP-005-A
8/18/93

SIZE D 22 X 34



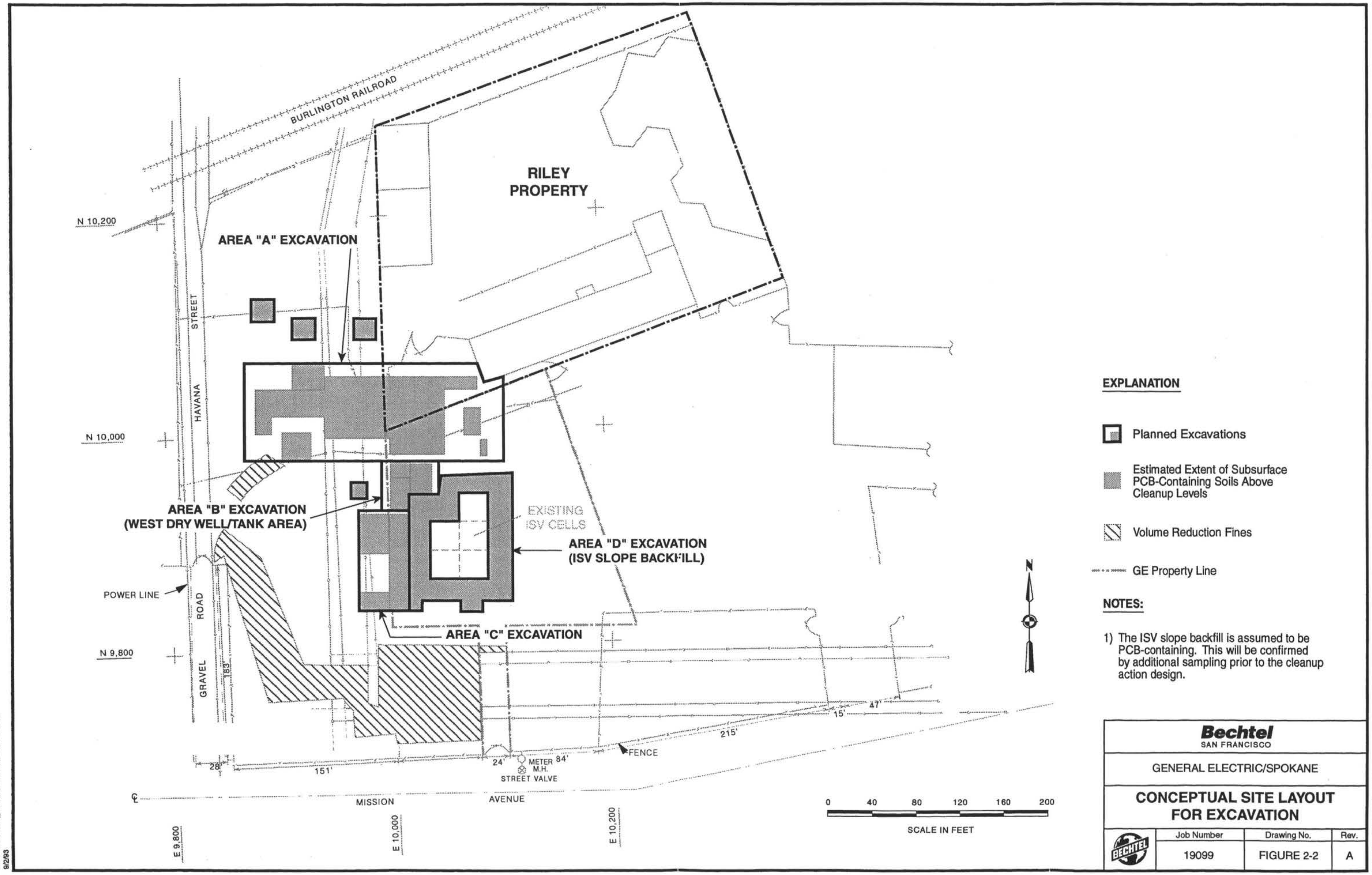

**BECHTEL**
SAN FRANCISCO

GENERAL ELECTRIC/SPOKANE

SITE LAYOUT FOR ISV DEMONSTRATION TEST

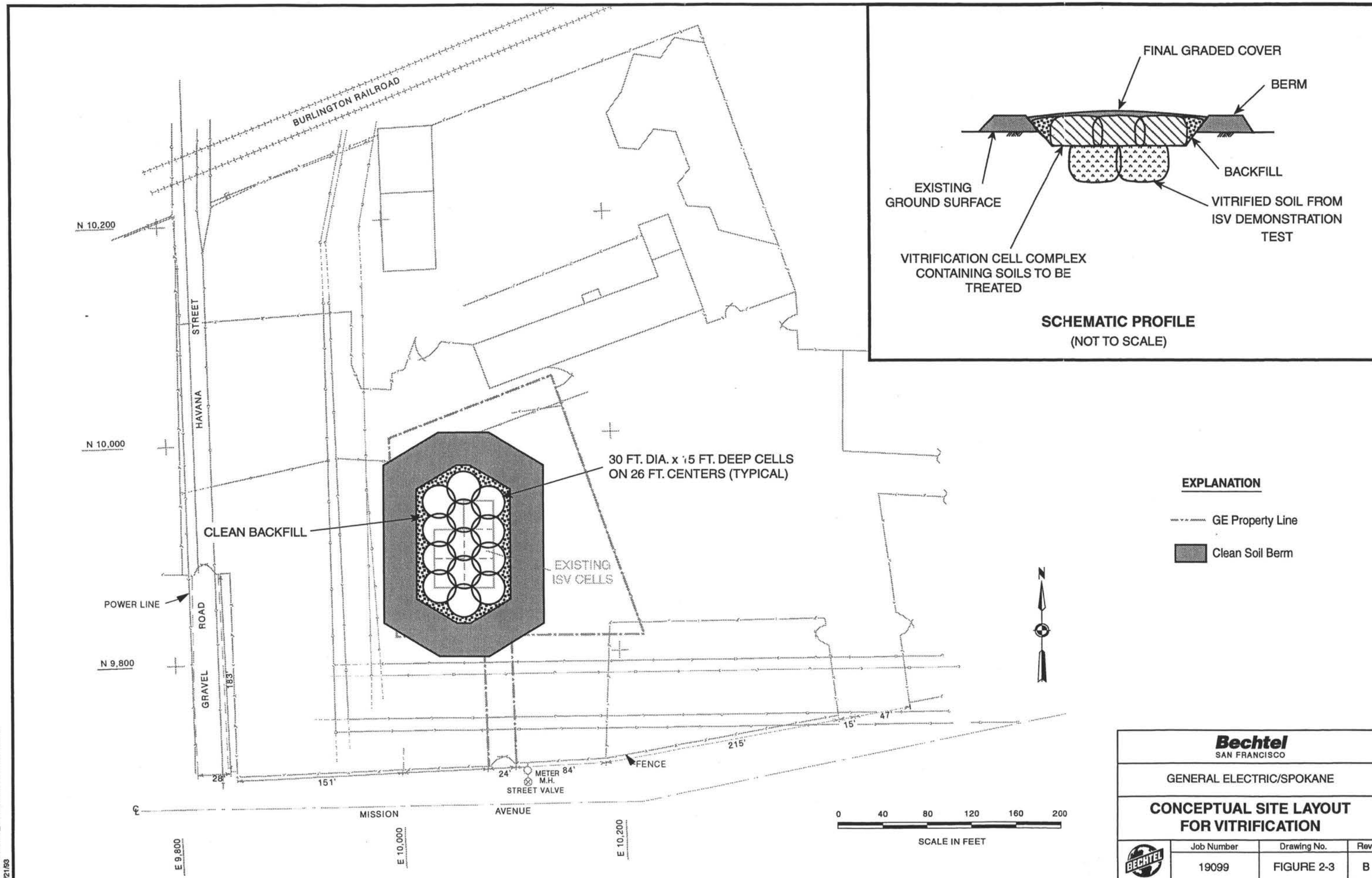
| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 2-1 | B |

IPWMP1-003-B
9/3/93



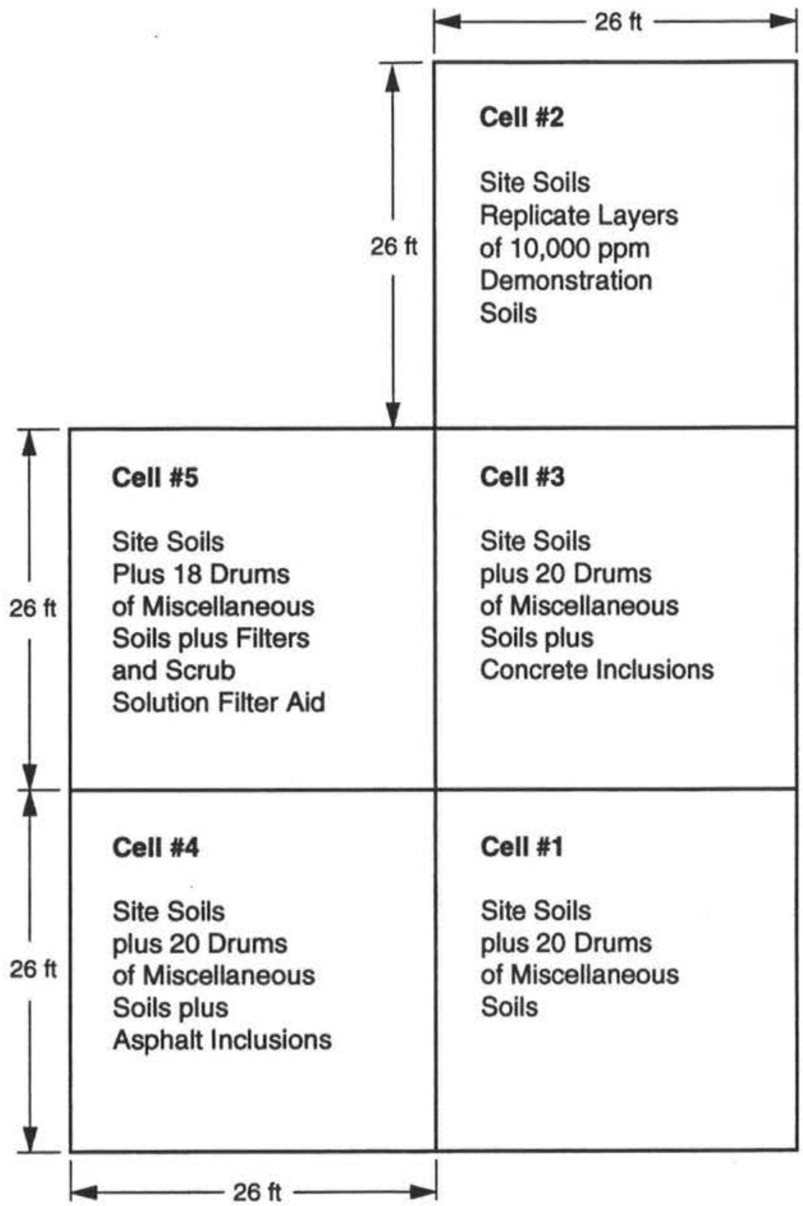

GESP008da/RD_RA.../IPWMP/IPWMP-007-A
9/2/93

93-2442b.003 7-15-93 ra/ra:6
REV.da 8/17/93




GESP012de/RD_RA.../IPWMP/IPWMP-008-B
9/21/93

93-2442b.003 7-15-93 rs/rs:6
REV.da 8/17/93

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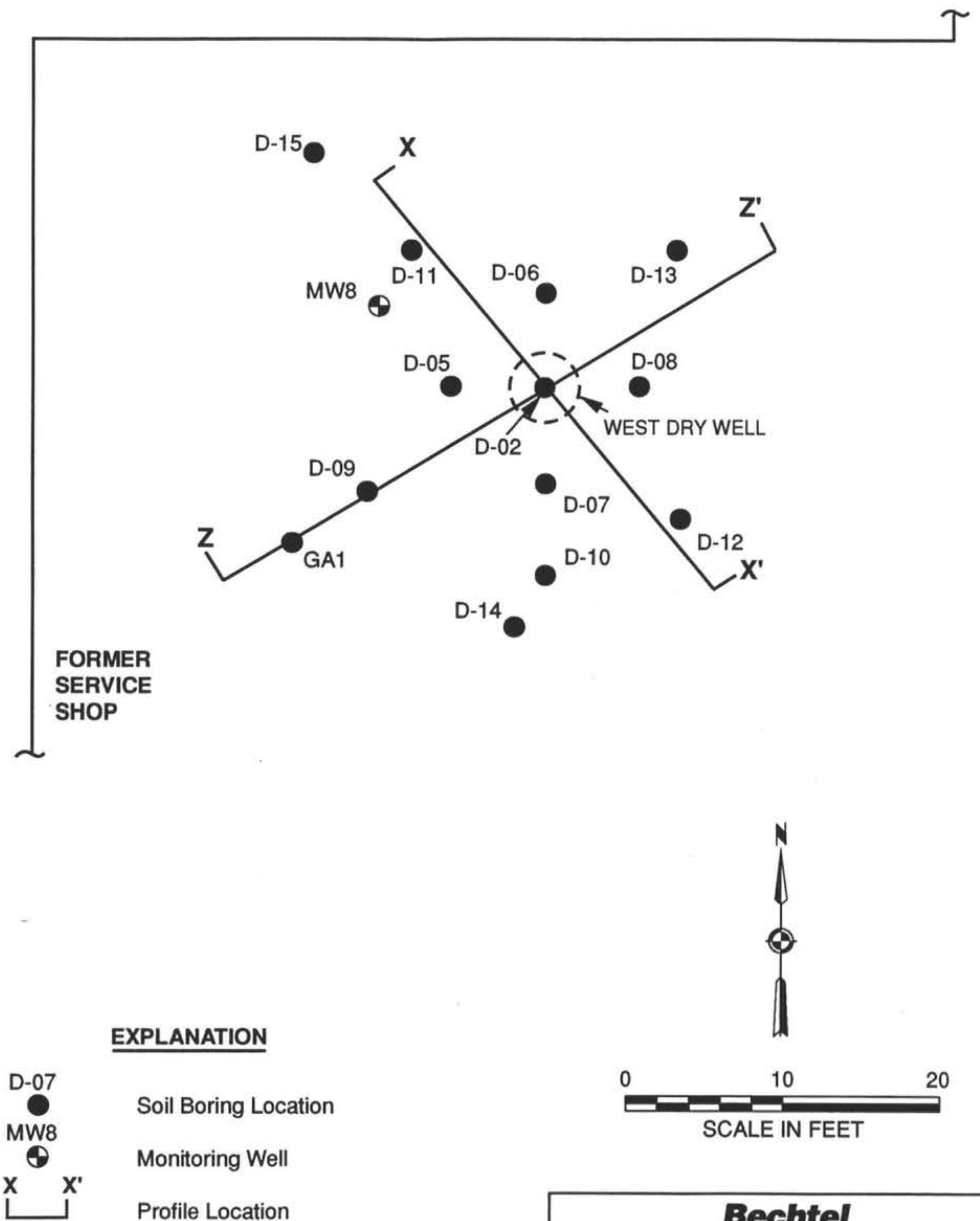
GENERAL ELECTRIC/SPOKANE

## ISV TEST CELL CONTENTS

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 2-4 | B |

GESP010cda/RD_ /STP/STP-005-B
9/17/93

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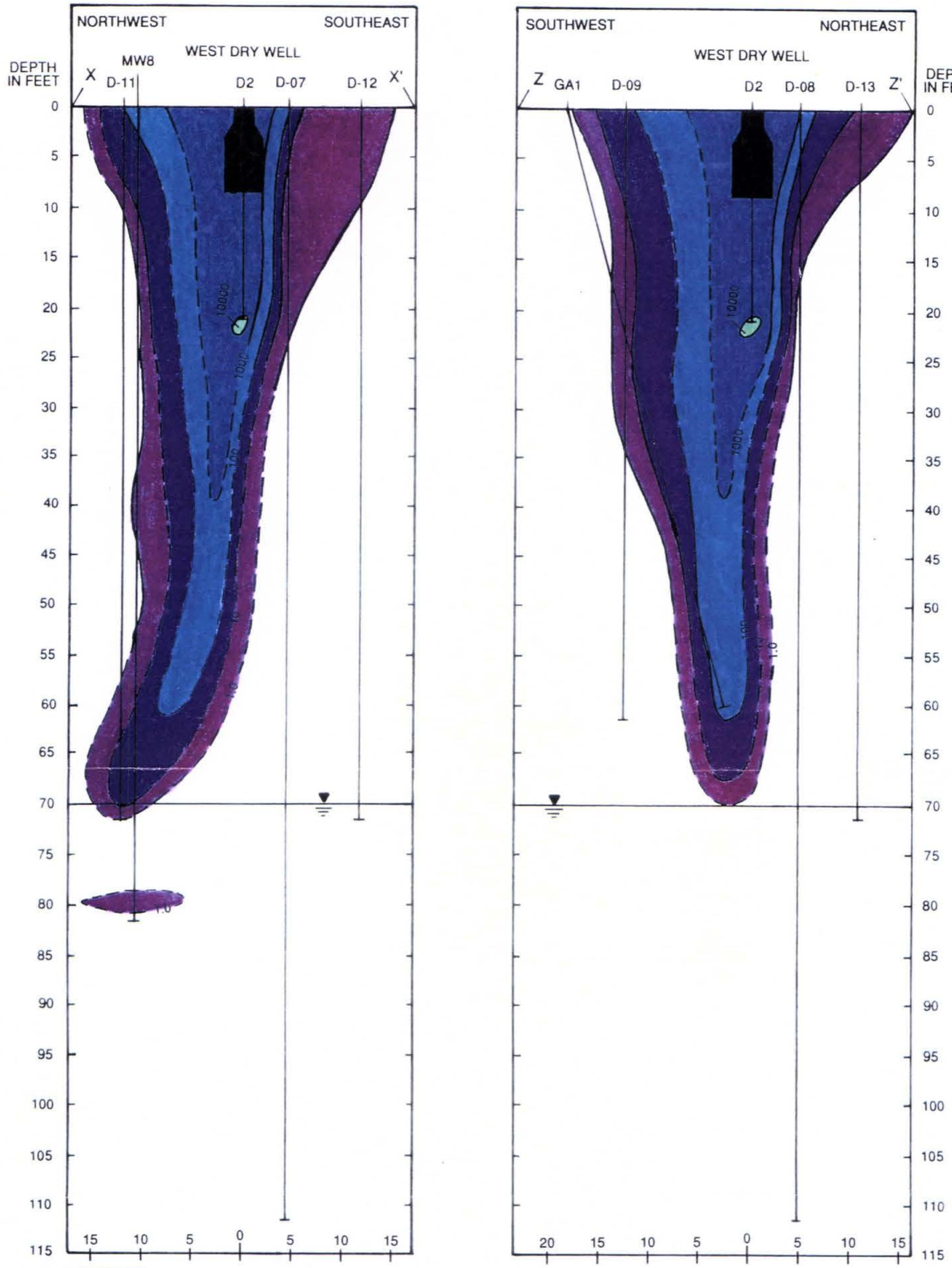
GENERAL ELECTRIC/SPOKANE

**LOCATIONS OF PROFILES IN THE WEST DRY WELL AREA**

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 3-1 | C |

GESP011da/RD_RA WP/STP/STP-011-C
9/21/93

STP-008-A
6/16/93




EXPLANATION

10 — Line of approximately equal PCB concentration (mg/kg)

≥ 10,000 mg/kg

1,000 - 10,000 mg/kg

100 - 1,000 mg/kg

10 - 100 mg/kg

1 - 10 mg/kg

0 10 20

SCALE IN FEET

NOTE:

For location of section line see Figure 3-1.

VERTICAL EXTENT OF PCBs IN THE WEST DRY WELL AREA SOILS

GENERAL ELECTRIC/SPOKANE

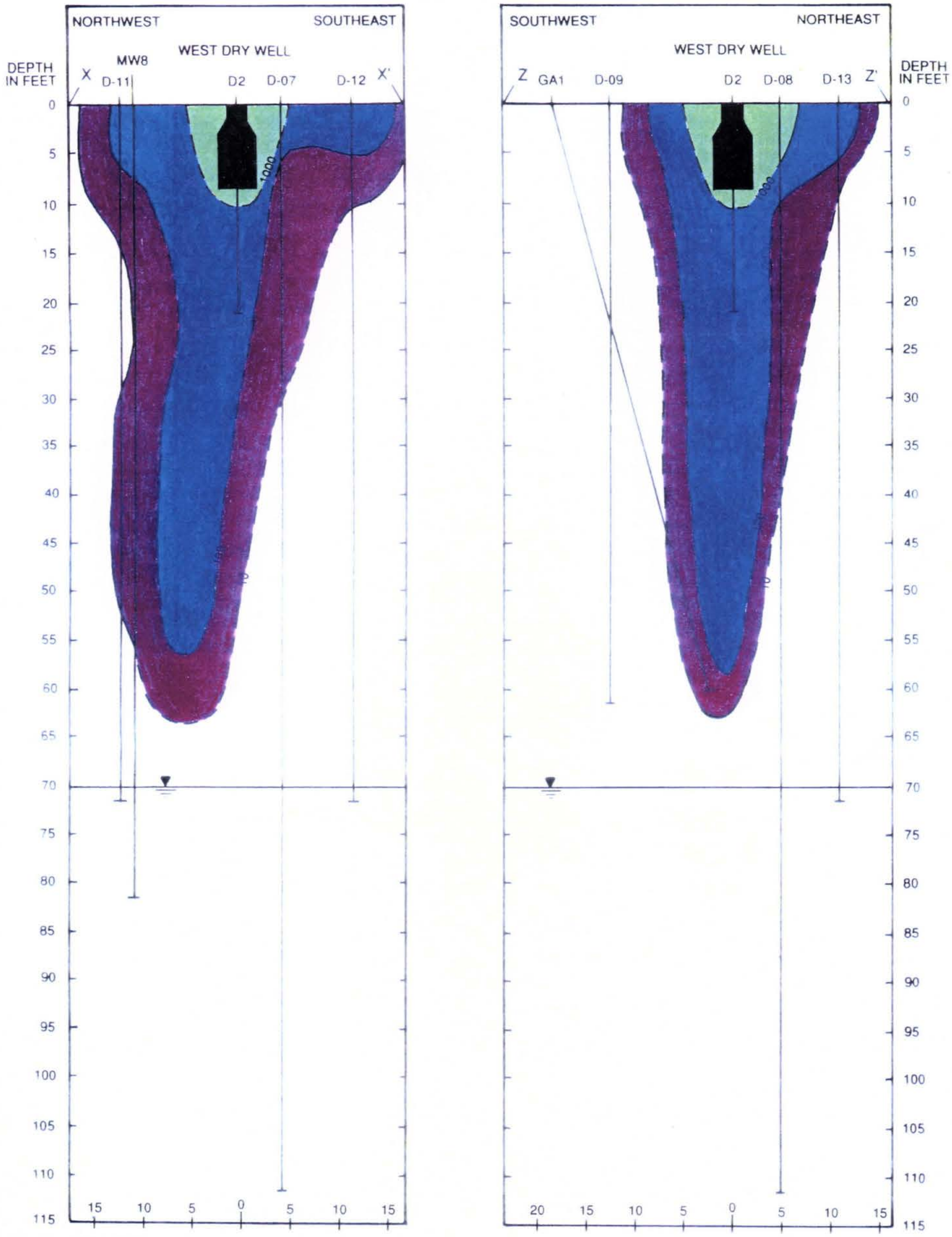
BECHTEL
SAN FRANCISCO

| JOB NO. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 3-2 | A |

5.1 V1

Color #4

STP-018-A
8/25/93




## EXPLANATION

Line of approximately equal total Petroleum Hydrocarbons concentration (mg/kg)

≥ 1,000 mg/kg

100 - 1,000 mg/kg

10 - 100 mg/kg

0 10 20
SCALE IN FEET

NOTE:

For location of section line see Figure 3-1.

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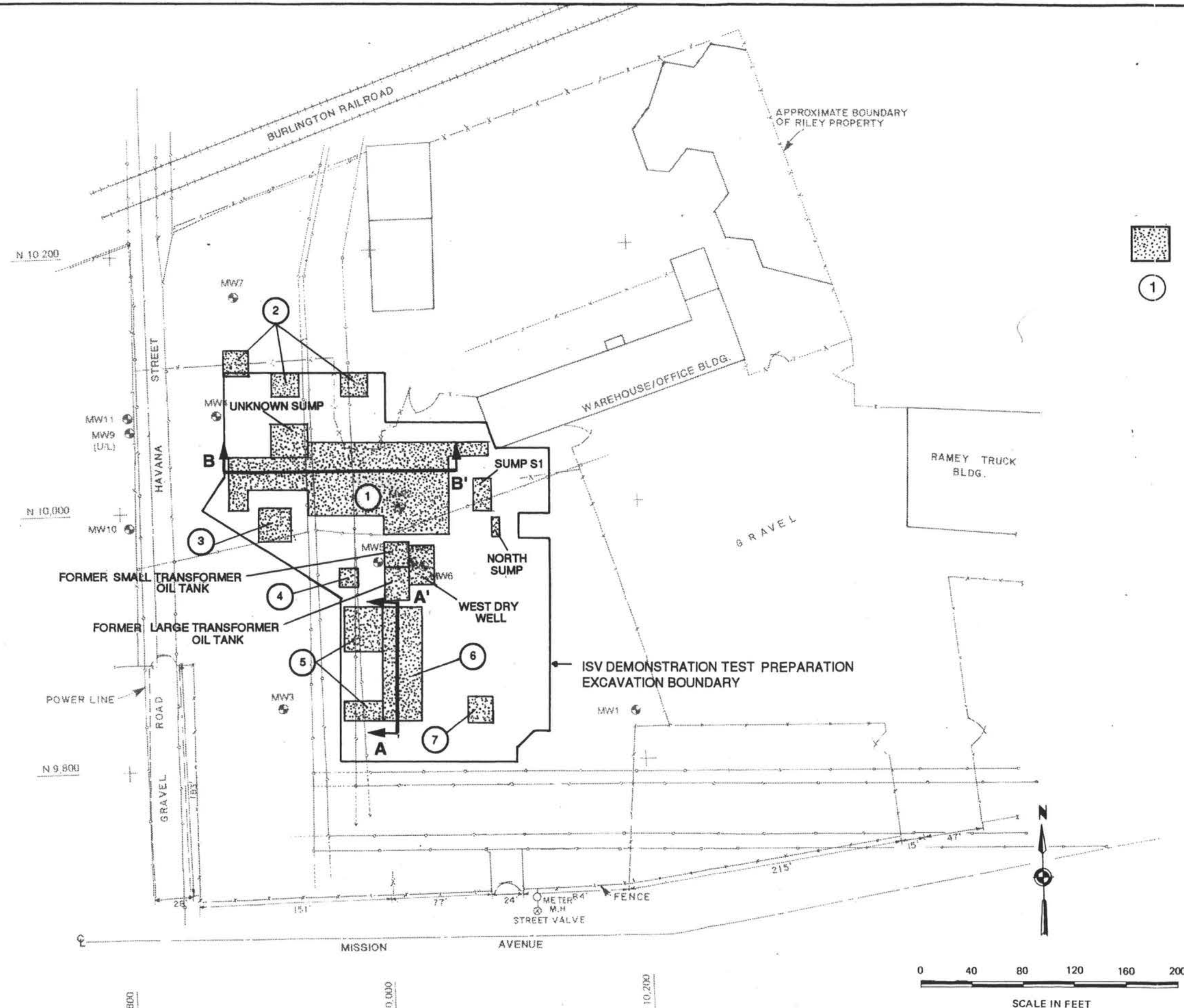
VERTICAL EXTENT OF TPH IN THE WEST DRY WELL AREA SOILS

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 3-3 | A |

Color #3

5.1.V1

SIZE D




## EXPLANATION

Subsurface area with remaining PCB concentration above 10 mg/kg

(1) Area Number

## NOTES:

1) This drawing represents PCB concentrations after completion of the interim actions and ISV test cell construction.
2) This drawing does not include the volume reduction fines which may require treatment.
3) For profile of PCBs in soil in the West Dry Well area, see Figure 3-2.
4) For profiles A-A', B-B' see Figure 3-5.

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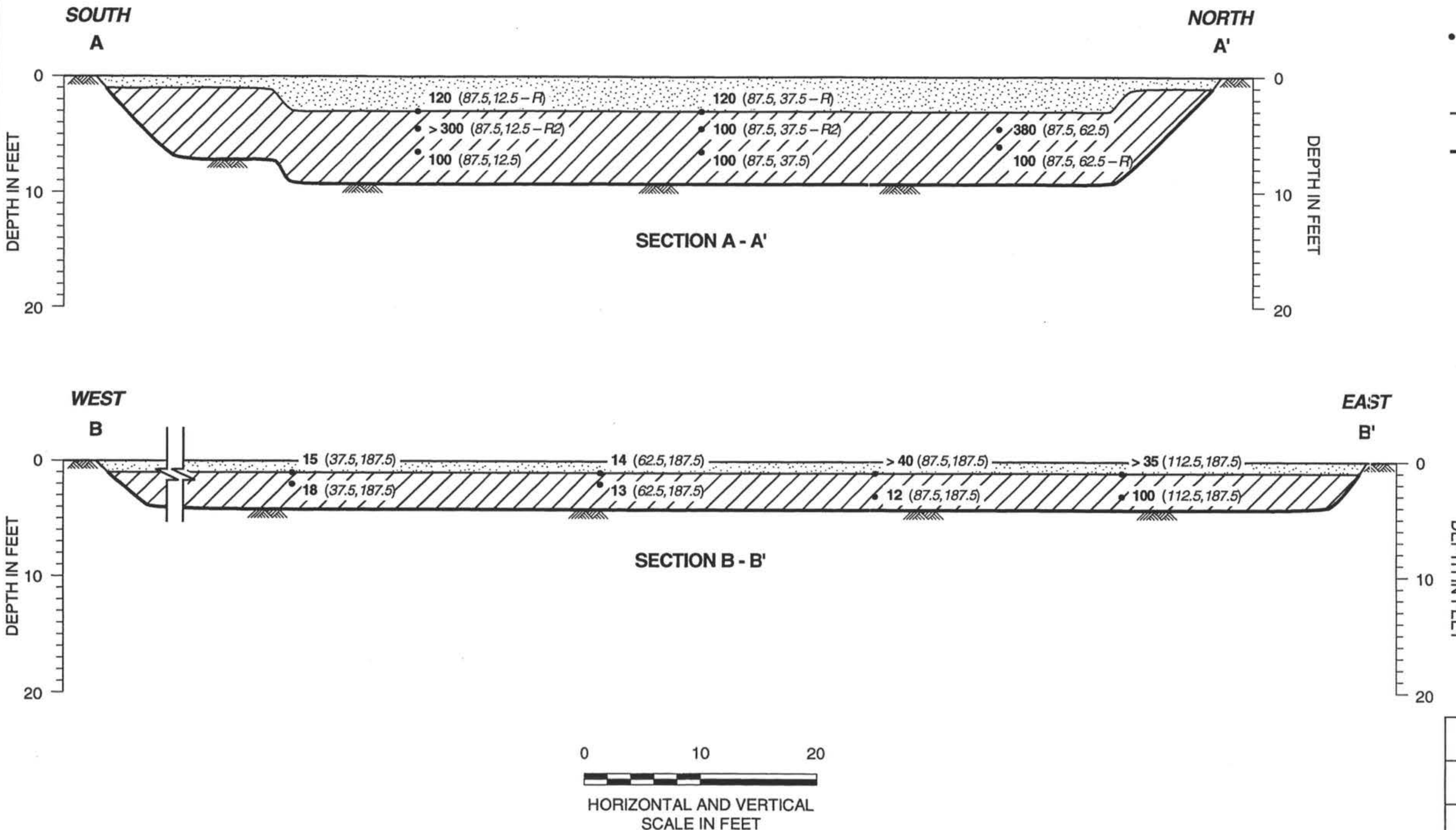
**AREAS OF SOIL TO BE TREATED AND PROFILE LOCATIONS**

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 3-4 | C |

STP-008-C
9/16/93




**EXPLANATION**

Estimated extent of soil with PCB concentrations above cleanup level (based on Table 3-1)

Previously excavated, backfilled area (PCB concentrations less than cleanup level)

120 (87.5, 37.5 – R)

PCB concentration in mg/kg, with sample number in parentheses

Boundary of previous excavation

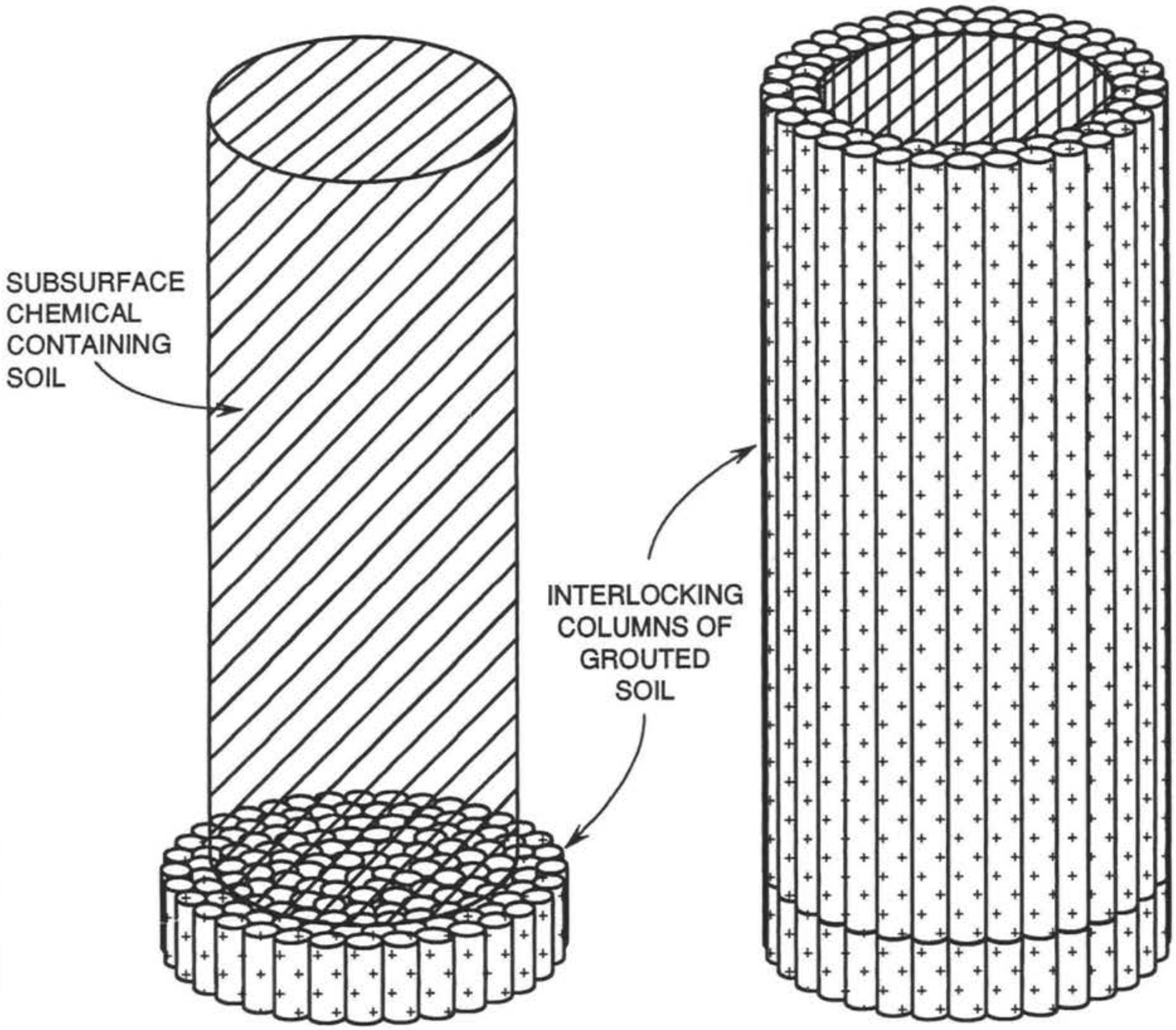
Estimated boundary of soil requiring excavation (based on Table 3-1)

**NOTE:**

1) Section lines are shown in Figure 3-4.

| | | |
|---|---|---|
| **Bechtel** SAN FRANCISCO | | |
| GENERAL ELECTRIC/SPOKANE | | |
| **PROFILES OF SHALLOW SOILS TO BE TREATED** | | |
| Job Number | Drawing No. | Rev. |
| 19099 | FIGURE 3-5 | A |

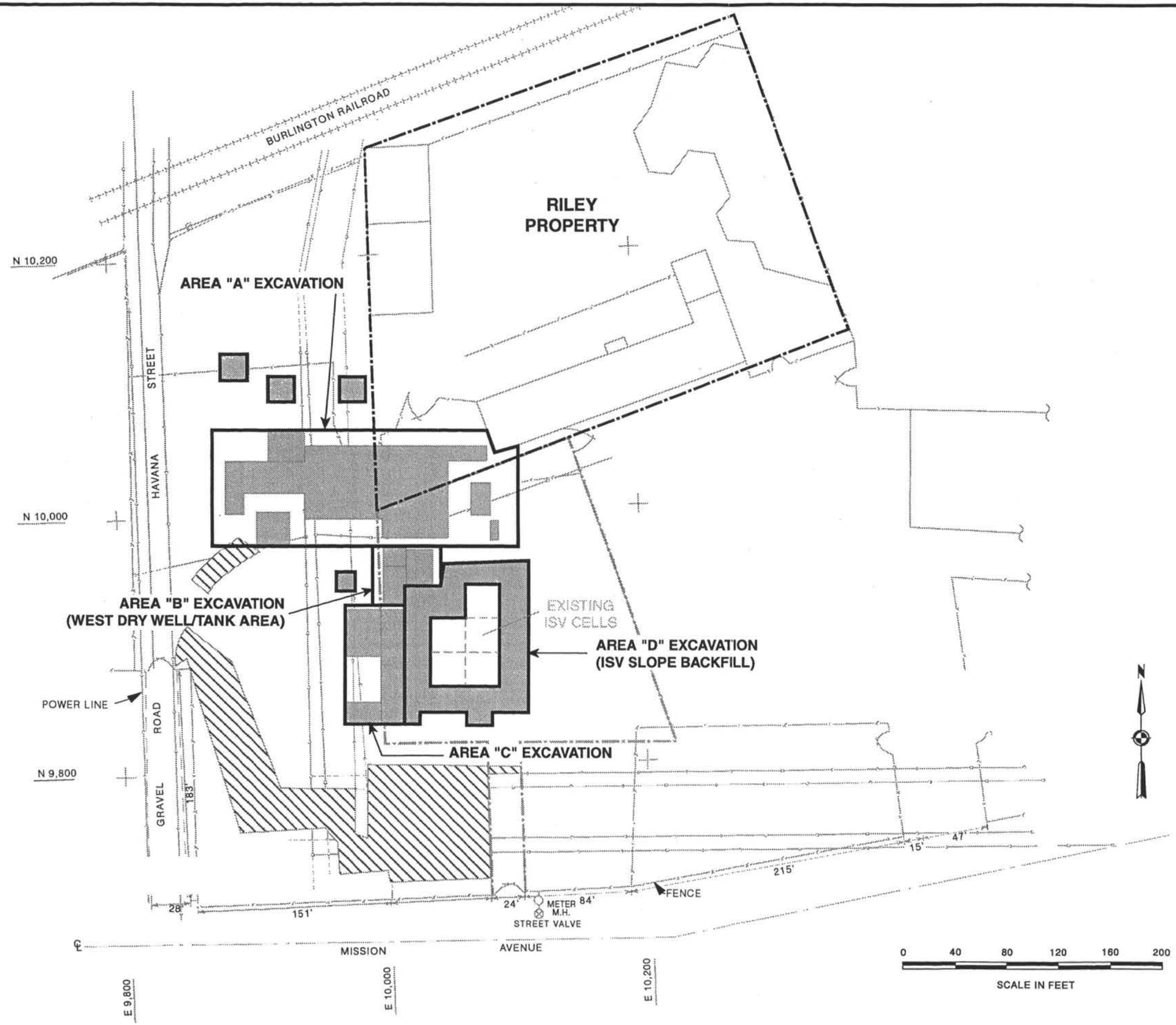
GESP005da/RD_RA WP/STP/STP-016-A
8/18/93




**STAGE 1**
BOTTOM BARRIER
IN PLACE

**STAGE 2**
BOTTOM AND SIDE BARRIERS
IN PLACE

| | | | |
|---|---|---|---|
| **Bechtel** SAN FRANCISCO | | | |
| GENERAL ELECTRIC/SPOKANE | | | |
| **CONCEPTUAL SCHEME FOR DEEP SOIL GROUTING** | | | |
| BECHTEL | Job Number | Drawing No. | Rev. |
| | 19099 | FIGURE 4-1 | B |




**EXPLANATION**

Planned Excavations

Estimated Extent of Subsurface PCB-Containing Soils Above Cleanup Levels

Volume Reduction Fines

GE Property Line

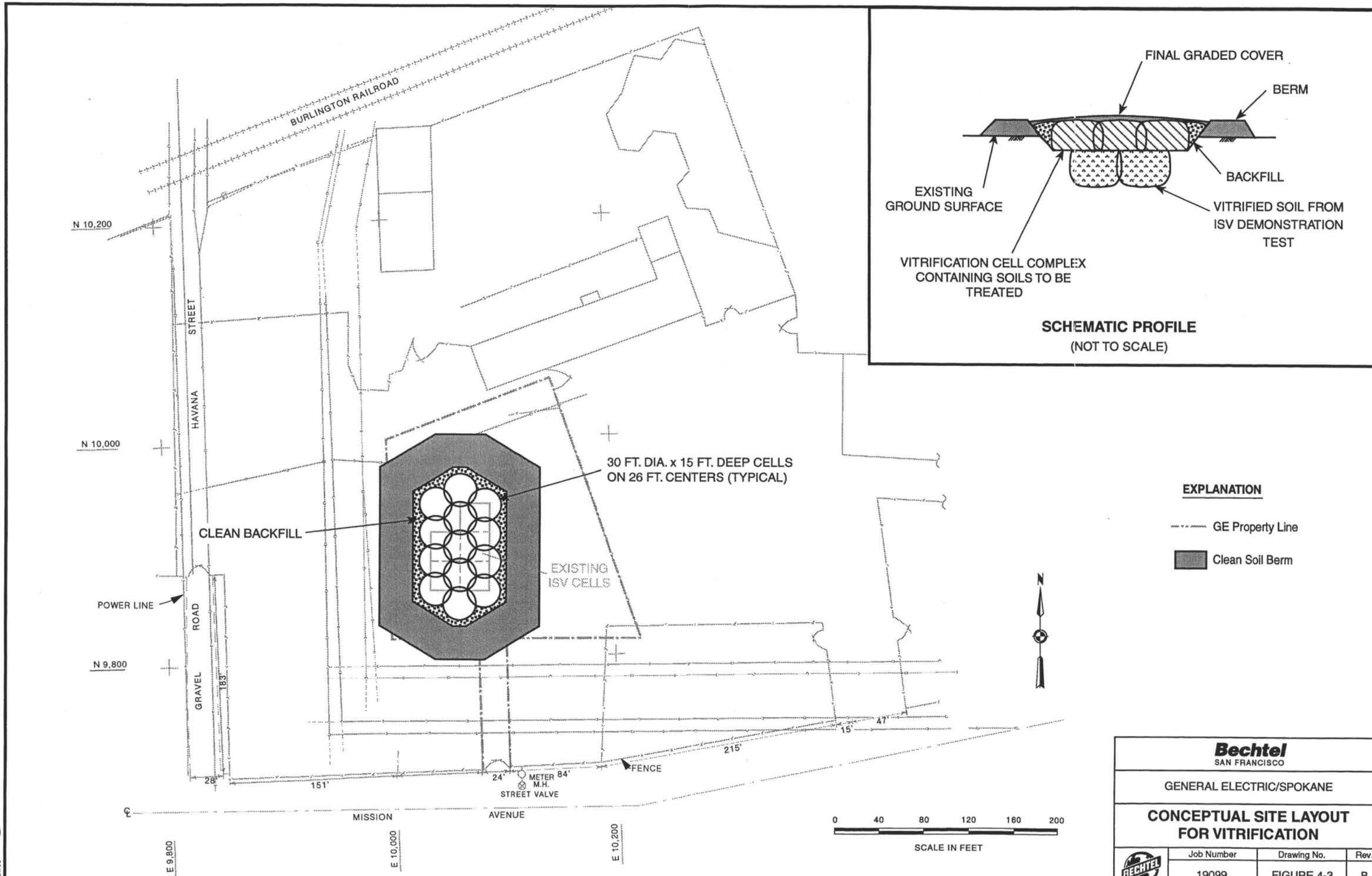
**NOTES:**

1) The ISV slope backfill is assumed to be PCB-containing. This will be confirmed by additional sampling prior to the cleanup action design.

| | | |
|---|---|---|
| **Bechtel** SAN FRANCISCO | | |
| GENERAL ELECTRIC/SPOKANE | | |
| **CONCEPTUAL SITE LAYOUT FOR EXCAVATION** | | |
| Job Number | Drawing No. | Rev. |
| 19099 | FIGURE 4-2 | A |

GESP008da WP/STP/STP-026-A
9/2/93

93-2442b.003 7-15-93 rs/rs:6
REV.da 8/17/93

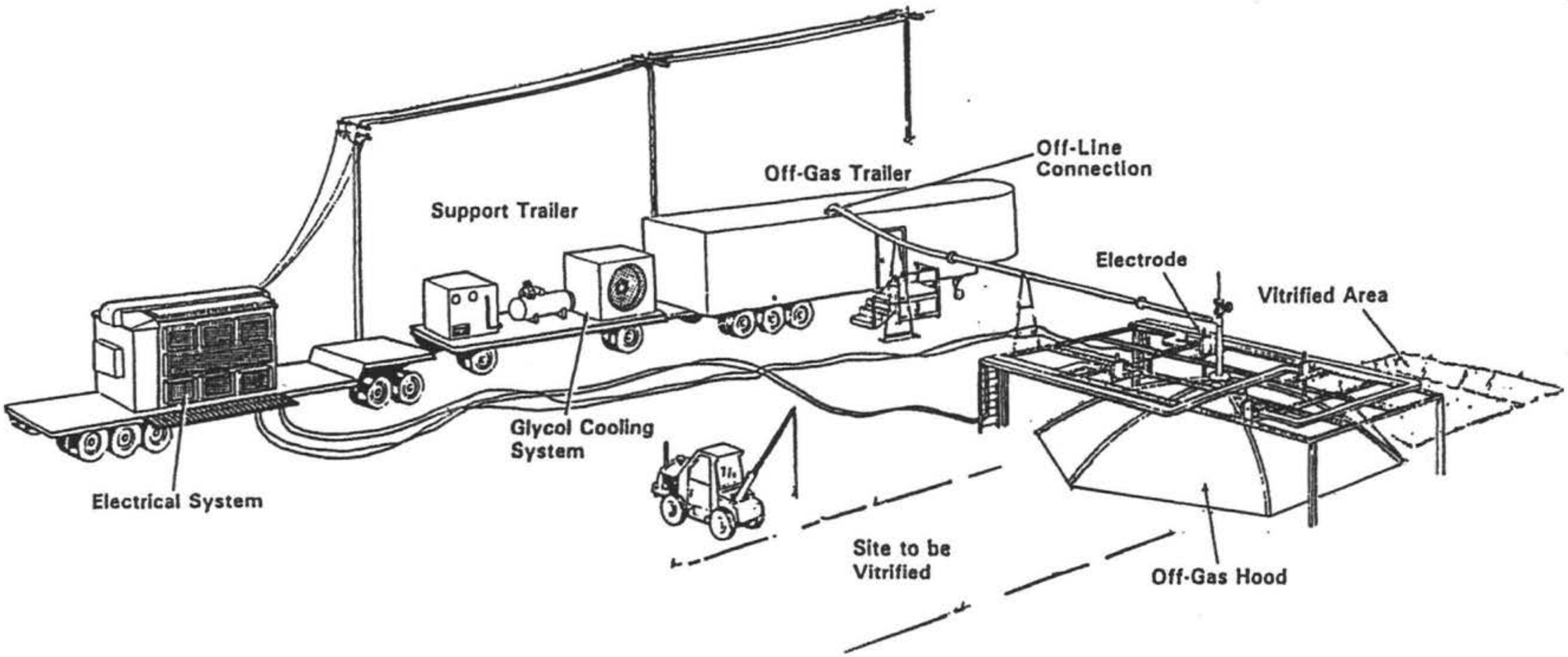


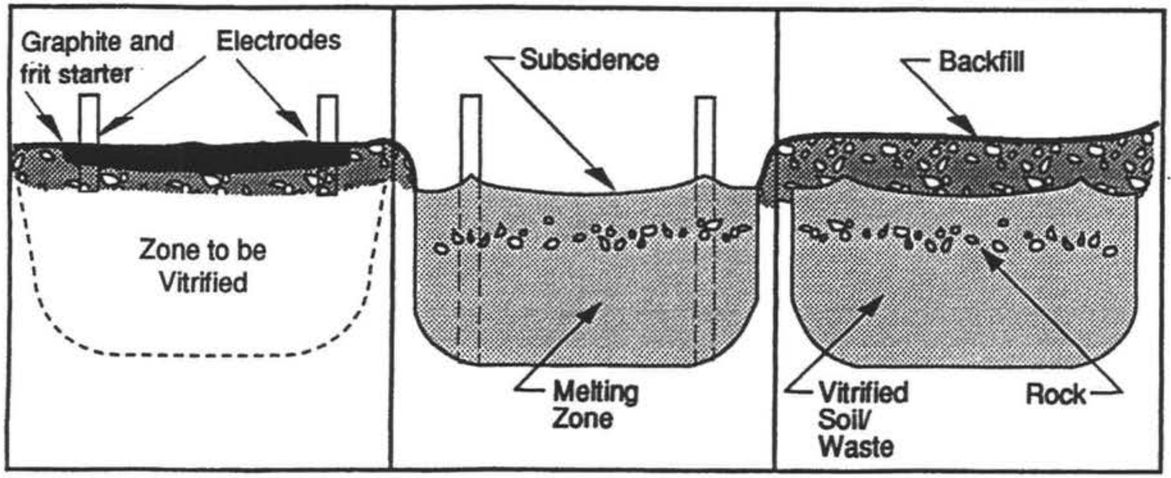

| | | |
|---|---|---|
| **Bechtel** SAN FRANCISCO | | |
| GENERAL ELECTRIC/SPOKANE | | |
| **CONCEPTUAL SITE LAYOUT FOR VITRIFICATION** | | |
| Job Number | Drawing No. | Rev. |
| 19099 | FIGURE 4-3 | B |

GESP011d WP/STP/STP-027-B
9/21/93

93-2442b.003 7-15-93 ra/ra:6
REV.da 8/17/93

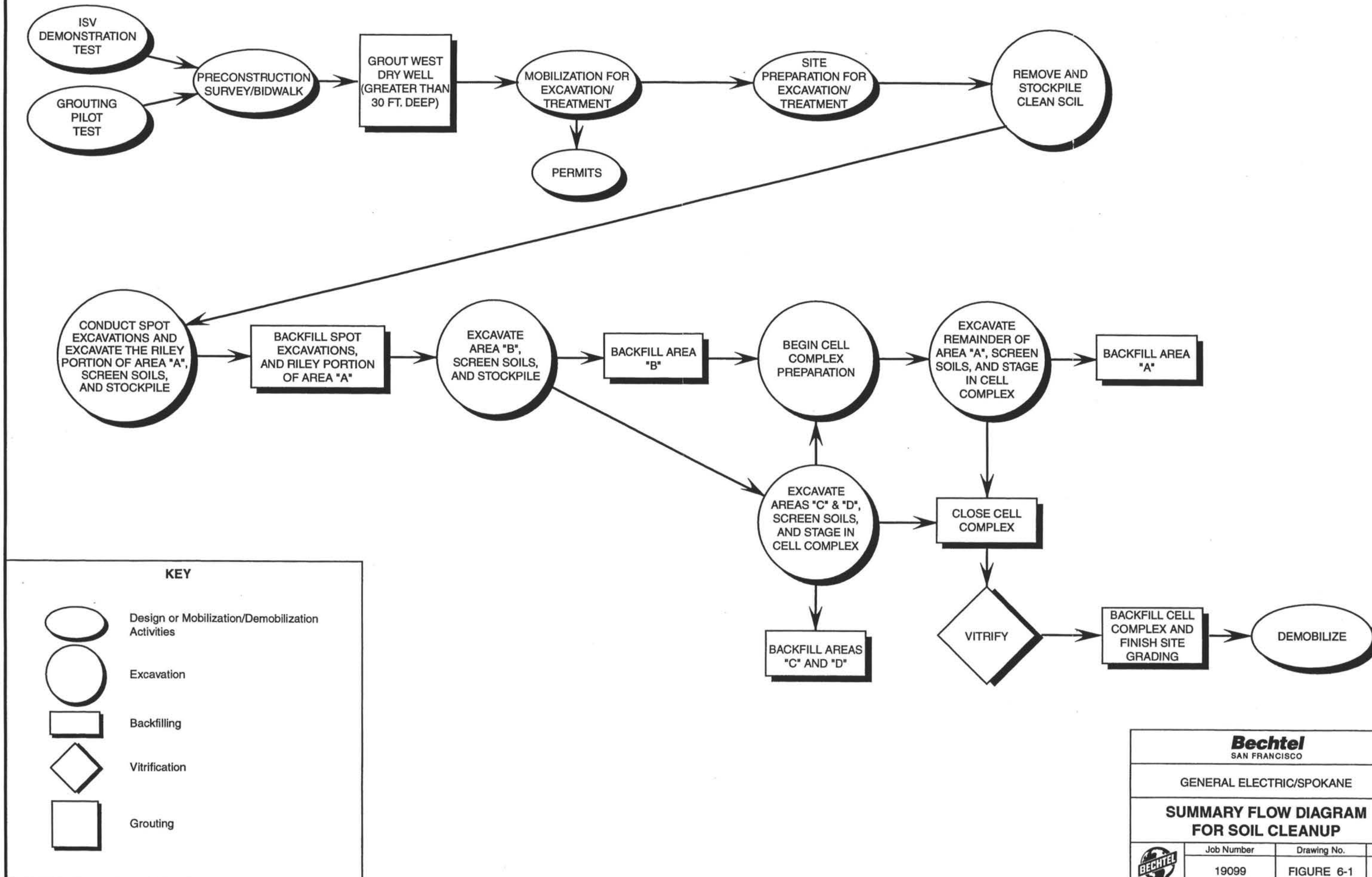
STP-021-A
mf 8/19/93




(Courtesy of Geosafe Corporation)

| | | | |
|---|---|---|---|
| **Bechtel** SAN FRANCISCO | | | |
| GENERAL ELECTRIC/SPOKANE | | | |
| **SCHEMATIC OF SOIL VITRIFICATION CONCEPT** | | | |
| | Job Number | Drawing No. | Rev. |
| | 19099 | FIGURE 4-4 | A |



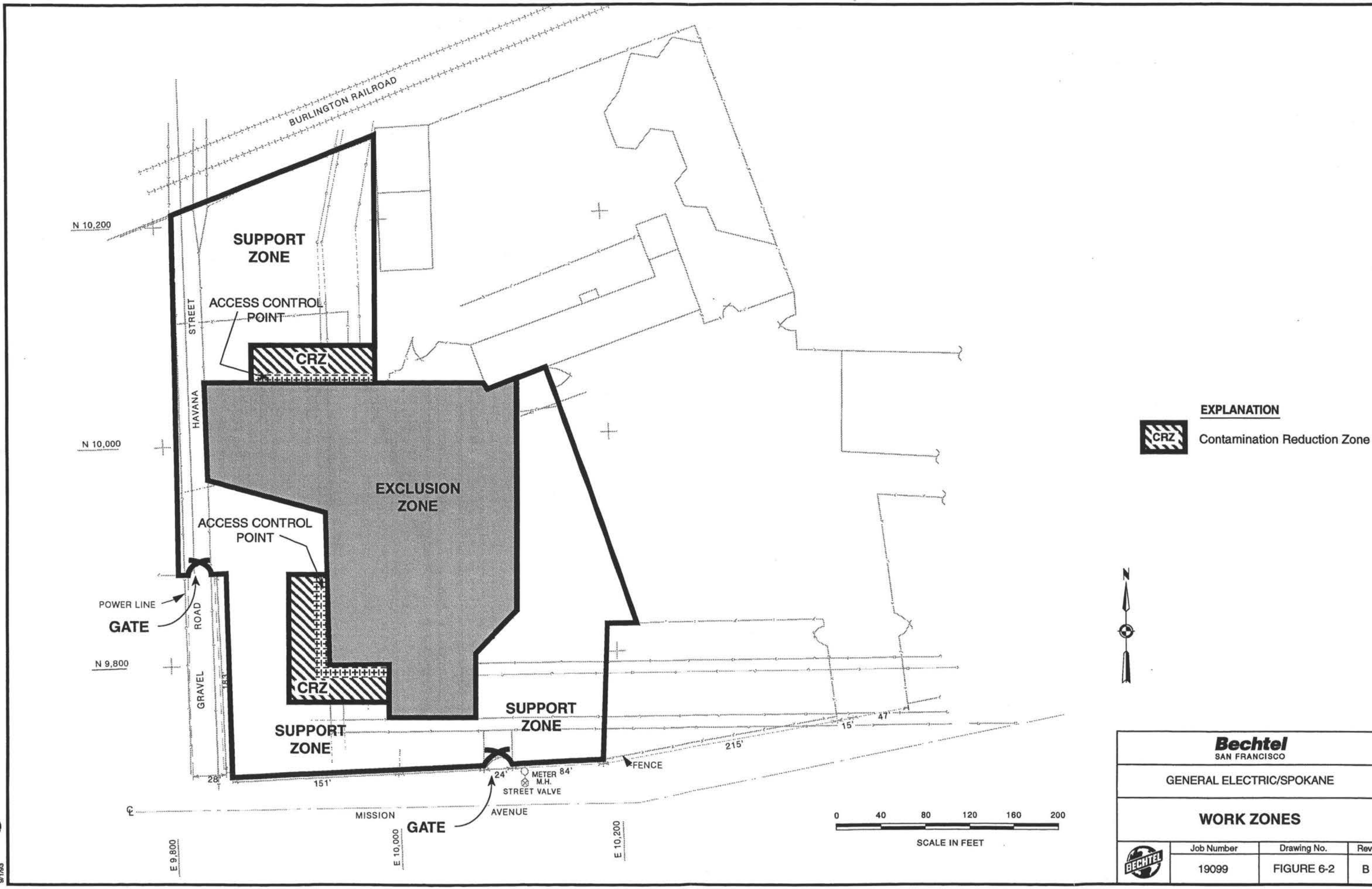

GESP011da/RD_RA WP/STP/STP-022-C
9/21/93

**Bechtel**
SAN FRANCISCO

GENERAL ELECTRIC/SPOKANE

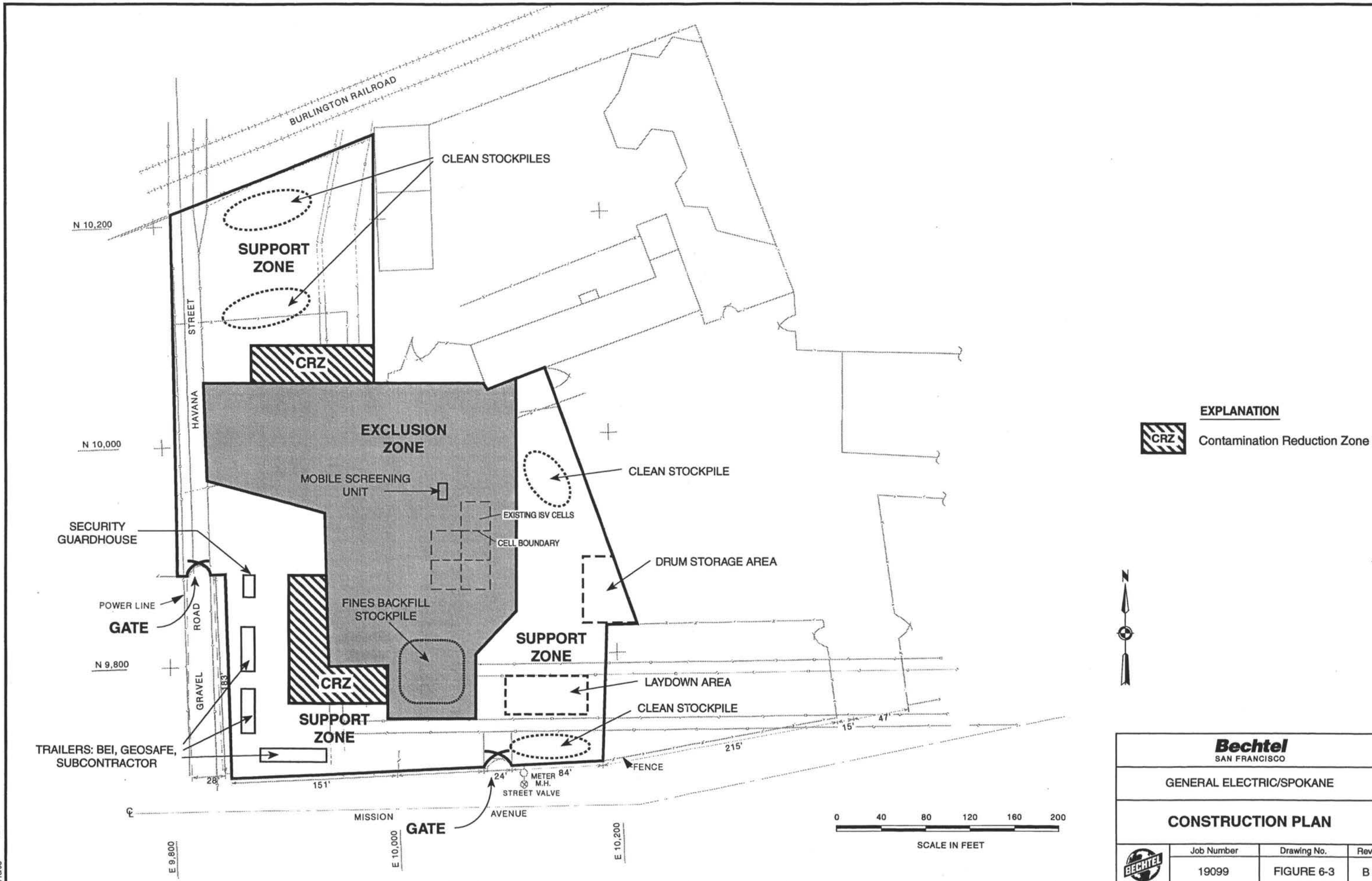
**SUMMARY FLOW DIAGRAM FOR SOIL CLEANUP**

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 6-1 | C |




GESP008da/ WP/STP/STP-023-B
9/1/93

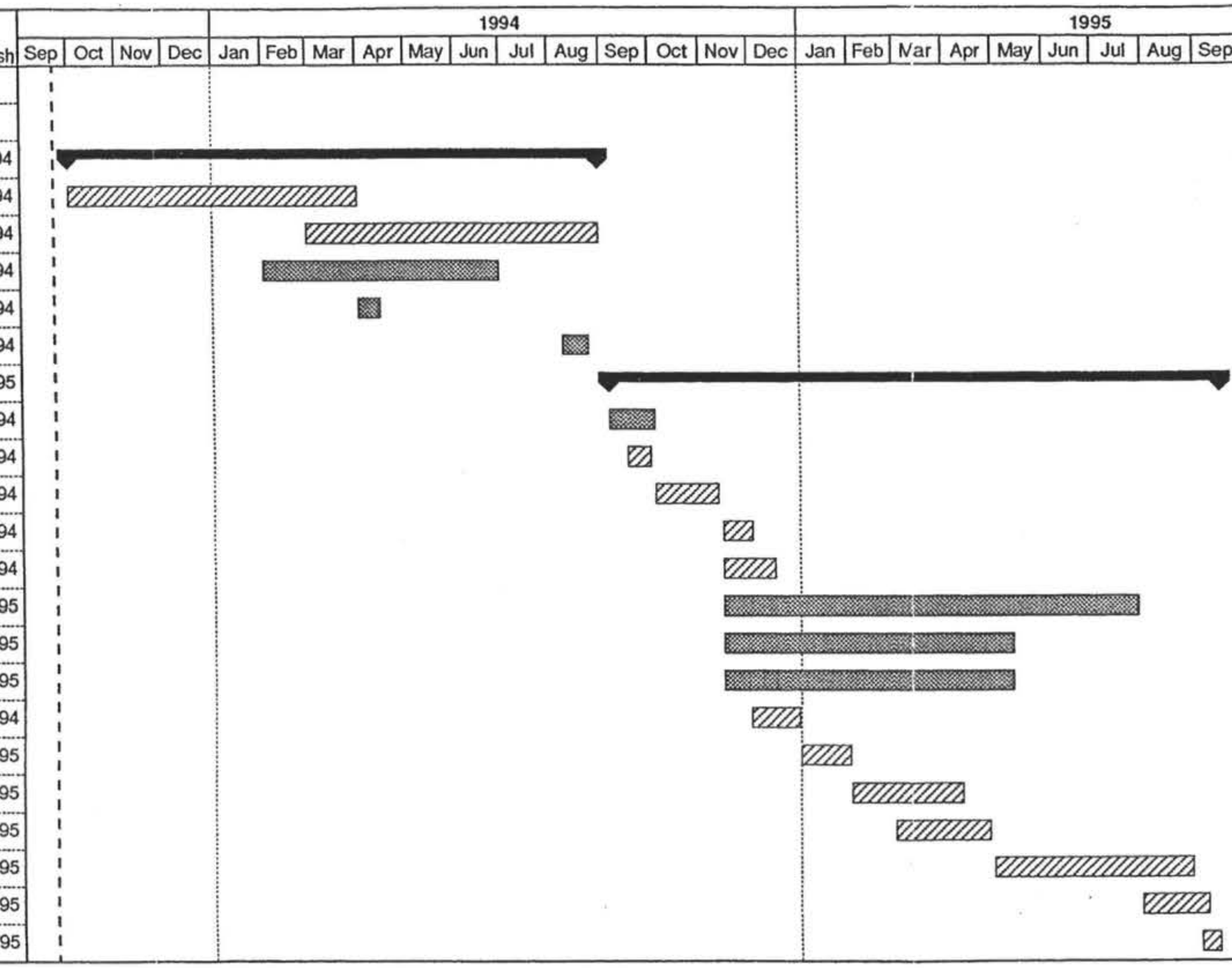
93-2442b.003 7-15-93 ra/ra:6
REV.da 8/17/93




GESP009d... WP/STP/STP-024-B
9/13/93

93-2442b.003 7-15-93 ra/ra:6
REV.da 8/17/93

| Name | Scheduled Start | Scheduled Finish |
|---|---|---|
| Design Phase | 10/1/93 | 8/30/94 |
| Preliminary design | 10/1/93 | 4/1/94 |
| Final design, solicit bids and award | 2/28/94 | 8/30/94 |
| ISV demonstration test | 2/1/94 | 6/30/94 |
| Grouting pilot test | 4/1/94 | 4/15/94 |
| Pre-construction survey | 8/8/94 | 8/24/94 |
| Cleanup | 9/5/94 | 9/15/95 |
| Grouting west drywell | 9/5/94 | 10/3/94 |
| Mobilization for excavation | 9/16/94 | 9/30/94 |
| Excavate clean soils overlying chemical-containing soils | 10/3/94 | 11/11/94 |
| Establish exclusion, contaminant reduction, and support zones | 11/14/94 | 12/2/94 |
| Excavate contaminated soil in spots/Riley's property; scrape fine fill | 11/14/94 | 12/16/94 |
| Conduct verification sampling | 11/14/94 | 7/28/95 |
| Screening plant operation | 11/14/94 | 5/12/95 |
| Stockpile clean and chemical-containing soils | 11/14/94 | 5/12/95 |
| Backfill Riley's property & spot excavations | 12/1/94 | 12/30/94 |
| Winter delay | 12/31/94 | 1/31/95 |
| Excavate all remaining chemical-containing soils | 2/1/95 | 4/11/95 |
| Construct ISV cells and backfill excavation | 3/1/95 | 4/28/95 |
| Vitrify chemical-containing soils | 5/1/95 | 8/30/95 |
| Backfill ISV cells and grade site | 7/31/95 | 9/8/95 |
| Demobilize | 9/4/95 | 9/15/95 |




Date: 9/22/93

Critical Noncritical Milestone Summary

**Bechtel**
SAN FRANCISCO

GENERAL ELECTRIC/SPOKANE

# SOIL CLEANUP ACTION SCHEDULE

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 7-1 | B |

GESP012da/RI WP/STP/STP-025-B
9/22/93

GROUND-WATER MONITORING PLAN

GE-SPOKANE REMEDIAL DESIGN/REMEDIAL ACTION PROJECT

# GROUND-WATER MONITORING PLAN

Prepared for

GENERAL ELECTRIC COMPANY

by

BECHTEL ENVIRONMENTAL, INC.

San Francisco, California

December 1993

## TABLE OF CONTENTS

## TABLE OF CONTENTS (Cont'd)

## Section 1

## INTRODUCTION

This Ground-Water Monitoring Plan was prepared for General Electric Company (GE) by Bechtel Environmental, Inc. (Bechtel) as one of the Project Plans for the GE-Spokane Remedial Design/Remedial Action (RD/RA) Project, as required under the *Consent Decree (WDOE, 1993b)* between GE and the Washington Department of Ecology (WDOE). The purpose of this plan is to describe, and provide the rationale for, the proposed ground-water monitoring program.

The remainder of Section 1 provides the project background, cleanup goals, objectives and scope; and summarizes the results of previous site ground-water monitoring. Section 2 describes the proposed approach for ground-water monitoring and Section 3 describes methods and procedures. Section 4 describes reporting of the ground-water monitoring results and Section 5 presents a list of references cited. The specific requirements for the content of this plan are outlined in the Consent Decree. Table 1-1 provides a cross-reference indicating where the Consent Decree requirements are addressed in this plan.

Specific sampling and analysis procedures for ground-water monitoring are provided in the Ground-Water Sampling and Analysis Plan, quality control procedures are provided in the Quality Assurance Project Plan, and procedures for the management of residuals are provided in the Investigative and Project Waste Management Plan. Procedures for the management and evaluation of ground-water data are provided in the Data Management Plan.

### 1.1 Project Background

GE operated an apparatus service shop at East 4323 Mission Avenue in Spokane, Washington, during the period 1961 to 1980 (see Section 2 of the Summary Cleanup Action Planning Report for more information regarding the service shop). Figure 1-1 shows the project site location and Figure 1-2 shows the site layout, including the former facilities, as existed in 1989. Existing site surface features are shown in Figure 1-3.

In 1985, polychlorinated biphenyls (PCBs) were detected in site soils. GE subsequently performed Phase 1, 2, and 3 investigations of PCBs and other constituents in soil and ground water. More information about these investigations is presented in *Bechtel, 1986a*; *Bechtel, 1986b*; *Bechtel, 1987*; and *Golder, 1988*.

In 1989, the site was placed on the National Priorities List (NPL), by the U. S. Environmental Protection Agency (U.S. EPA). Therefore, the site investigations and cleanup are subject to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the Superfund Amendments and Reauthorization Act (SARA). The site is also subject to the State of Washington Model Toxics Control Act (MTCA). The U.S. EPA designated Washington Department of Ecology (WDOE) as the lead regulatory agency for this site.

The area designated as the NPL site includes the GE property and adjacent properties owned by Washington Water Power and Mr. Marvin E. Riley, doing business as Federal Construction Company. Following the change to NPL status, GE entered into an Agreed Order with WDOE. Under the terms of the Agreed Order, GE subsequently performed a two-phase remedial investigation (Phase 4 for soils and other solid materials and Phase 5 for ground water) and a baseline risk assessment (see *Bechtel, 1991a; Everest, 1992;* and *Golder, 1992*).

The remedial investigations indicated that PCBs were present in surface soils, in sediments in sumps and other underground structures, and in soils beneath these structures, including the West Dry Well where steam cleaning effluent was discharged during operation of GE's service shop. Concentrations of PCBs were also detected in ground-water samples collected from wells downgradient of the West Dry Well. Petroleum hydrocarbons, metals and volatile organic compounds (VOCs) were also detected in some soil or ground-water samples. The extent of residual chemicals is described in more detail in Section 2 of the Summary Cleanup Action Planning Report.

During the Phase 4 Remedial Investigation, GE conducted some interim actions, including demolition of the site building and excavation of underground structures and associated soils. These activities are described in the reference *Bechtel, 1991a*.

Since about 1986, GE has been exploring the possible use of in situ vitrification (ISV) for treating the soils containing PCBs at the site. The ISV technology, which is a thermal treatment/immobilization process, is described further in Section 4 of the Soil Treatment Plan. In order to use this technology for treatment of PCB-containing soils at the GE-Spokane site, a Toxic Substances Control Act (TSCA) - required demonstration test must be performed so that the vendor of the technology, Geosafe Corporation (Geosafe), may obtain a TSCA permit for "disposal" of PCBs.

It was planned to conduct the ISV Demonstration Test at the GE-Spokane site in 1991. Shallow soils previously identified as PCB-containing were excavated and placed in five test cells along with soils spiked with imported PCBs and other materials removed during the interim actions described above. The preparations for the ISV Demonstration Test are described more completely in the reference *Bechtel, 1991b*. The planned demonstration test was delayed due to a mishap which occurred during an Operational Acceptance Test of the ISV equipment conducted by Geosafe at its Richland, Washington test site.

Under TSCA, a certificate of disposal must be provided within one year from the date when PCBs are "taken out of service" or removed from their original location. The PCB-spiked soils in one of the ISV test cells are subject to this requirement. The TSCA Section of U.S. EPA Region X was notified that, due to the delay in the planned ISV Demonstration Test, the spiked soils might remain in place for more than one year. U.S. EPA Region X granted an extension of the disposal certification requirement, with the provision that a plan and schedule for properly disposing of the materials "taken out of service" be submitted by October 1, 1993. A temporary cap was placed over the test cells in November 1991 to prevent infiltration of precipitation into the test cells and periodic site maintenance and inspections have been conducted since that time. The current schedule provided by Geosafe indicates the ISV Demonstration Test may be performed in early 1994.

After completion of the remedial investigations, GE conducted a feasibility study to evaluate remedial alternatives for soil and ground water (*Bechtel, 1992*). The feasibility study concluded that in situ vitrification would be the preferred cleanup action for soils, and institutional controls coupled with ground-water monitoring would be the preferred action for ground water. Contingent remedies were also identified in the feasibility study, for implementation in the event that ISV is not successfully demonstrated or ground-water monitoring and institutional controls are found to be ineffective. The contingent remedies are dechlorination for the soils; and extraction, treatment and discharge to a publicly-owned treatment works for the ground water.

In March 1993, WDOE issued a Cleanup Action Plan for the site *(WDOE, 1993a)*. The Cleanup Action Plan specifies PCBs and petroleum hydrocarbons as indicator chemicals for site cleanup and specifies the following cleanup levels:

| Medium | PCBs | Petroleum Hydrocarbons |
|---|---|---|
| Shallow Soils (≤ 15 ft deep) | 10 mg/kg | 200 mg/kg |
| Deep Soils (> 15 ft deep) | 60 mg/kg | 200 mg/kg |
| Ground Water | 0.1 mg/L | not applicable |

The Cleanup Action Plan specifies that the cleanup action for soils is treatment by vitrification and that the cleanup action for ground water is compliance monitoring and institutional controls; which are the preferred remedies identified in the feasibility study. The Cleanup Action Plan also specifies the same contingent remedies identified in the feasibility study. In-situ stabilization of some of the deep soils (grouting of soils below the West Dry Well from about 30 feet below ground surface to about 10 feet into the saturated zone) will also be performed because it is unlikely that the ISV technology will be sufficiently developed for treatment of soils at such depths.

The Consent Decree between GE and WDOE *(WDOE, 1993b)* outlines GE's responsibilities in performing the cleanup, including a specific scope and schedule of activities and deliverables. This document is a required deliverable under the Consent Decree.

## 1.2 Goals of Cleanup Action

The cleanup goal for ground water is to reduce the concentration of PCBs in ground water to below the cleanup level of 0.1 μg/L.

Chemicals in soil will be treated directly by vitrification or immobilized by grouting. This is expected to reduce ground-water PCB concentrations to below the cleanup level over time, through the natural process of dispersion following the elimination of the chemical sources in soil. Ground-water monitoring will be implemented to track the changes in concentrations for a review period of five years.

## 1.3 Objectives and Scope

The objectives of the ground-water monitoring program are to monitor ground-water levels and ground-water quality, to evaluate the performance of the cleanup action, and to demonstrate that there is no further migration of chemicals in ground water. Ground-water level data will provide information regarding the:

- Ground-water flow conditions beneath and downgradient of the site;
- Vertical distribution of hydraulic head; and
- Changes in hydraulic gradients and direction of flow.

Ground-water chemical quality data will provide information regarding the:

- Water quality beneath and downgradient of the site;
- Performance and effectiveness of the soil cleanup action as it pertains to ground-water quality; and
- Changes in concentrations of chemicals in ground water, which could travel offsite, and provide early warning of such changes.

In order to accomplish the above objectives, a long-term ground-water monitoring network will be installed. Ground-water level measurements and samples for chemical analysis will be collected quarterly from each well, for a period of five years. Analysis for PCBs will be performed quarterly and analysis for total petroleum hydrocarbons (TPH), and volatile organic compounds (VOCs) will be performed annually. After five years, WDOE will review the monitoring program.

The long-term ground-water monitoring network will consist of nine monitoring wells, one upgradient and eight downgradient. Thirteen currently operating monitoring wells will be abandoned and four new wells will be installed to complete this network. Sections 2 and 3 explain the technical approach and rationale, and the construction procedures, respectively, for the proposed monitoring network.

## 1.4 Current Ground-Water Monitoring Program

The current ground-water monitoring network at the site consists of eighteen monitoring wells. The monitoring wells were constructed during three phases of remedial investigations performed by Bechtel (*Bechtel, 1987*) and Golder Associates, Inc. (*Golder, 1988* and *Golder, 1992*). The well locations are provided in Figure 1-4. Eight wells are located onsite and the remaining ten wells are located offsite between the Union Pacific Railway and the Spokane River, northwest of the site.

The monitoring wells are two or four inches in diameter, with 0.02- or 0.04-inch slotted stainless steel screens. The riser casings are stainless steel to about ten feet above the water table and schedule 40 PVC from that depth to ground surface. The monitoring wells vary in depth from approximately 31 to 160 feet below ground surface. Table 1-2 lists the construction details and screened intervals of all the monitoring wells.

Permanent, dedicated sampling pumps are installed in all of the monitoring wells. The dedicated pump system is the Hydrostar HS8000, manufactured by Instrumentation Northwest, Inc. It consists of a stainless steel double check valve, positive displacement, piston pump and is capable of pumping from 3 to 5 gallons per minute (gpm). In previous sampling events, monitoring wells were purged with the dedicated pumps before sampling to ensure that a representative sample of ground water was collected. Field parameters were required to stabilize (electrical conductivity, pH, temperature, dissolved oxygen, and turbidity) and at least three well volumes were extracted before a water sample was collected.

Monitoring wells MW1 through MW5 were installed and sampled in 1986. Wells MW6 through MW11 were installed in 1988. All of the existing site wells were then sampled once in 1988. In July 1990, a "preliminary" round of sampling was

conducted prior to beginning the Phase 5 Remedial Investigation. During the Phase 5 Remedial Investigation monitoring wells MW12 through MW17 were installed. Quarterly sampling of all the wells was conducted from October 1990 to October 1991, when the sampling frequency was decreased to semi-annual.
The following analyses were performed for one or more samples collected during the July 1990 preliminary round or the first quarterly sampling round of October 1990: PCBs, purgeable halogens, purgeable aromatics, volatile organic compounds, semivolatile organic compounds, total petroleum hydrocarbons, and total organic carbon, and inorganic water quality (pH, electrical conductivity, total dissolved solids, total suspended solids, selected anions and alkalinity) to provide baseline water quality data. Since that time, only PCB (U.S. EPA Method 8080) analyses have been performed.

## 1.5 Summary of Previous Ground-Water Analyses

This section summarizes ground-water quality as determined from previous sampling and analysis. The chemicals detected in ground water, and their maximum concentrations, are listed in Table 1-3. Appendix A contains a compilation of all ground-water data collected up to the last sampling round available (January 1993).

Polychlorinated biphenyls are the only chemicals of concern in site ground water and the only chemicals for which WDOE has set ground-water cleanup levels. Lead, zinc, 1,2,3,5-tetrachlorobenzene and certain volatile organic compounds and phthalates have also been detected in site ground water, but generally not at concentrations of concern.

Figure 1-5 shows the distribution of PCBs in ground water. The PCBs are limited to a narrow zone extending downgradient from the West Dry Well, the suspected source area. Samples from MW5 and MW8, located immediately downgradient of the West Dry Well, have had consistent PCB detections at concentrations of approximately 1 to 8 μg/L. Samples from MW11, which is farther downgradient, have shown intermittent detections of PCBs at concentrations around 0.5 μg/L.

The VOCs detected in ground water are trichloroethene, tetrachloroethene, 1,1,1-trichloroethane, benzene and xylenes. There have been intermittent detections of these chemicals at low concentrations (from less than 1.0 to 20.0 μg/L) in samples from both upgradient and downgradient wells. Benzene is the only VOC detected at or above its maximum contaminant level (MCL) of 5.0 μg/L. The benzene detections were in (January 1988) samples from wells MW9U, MW9L, and MW11, which are located at the site boundary downgradient of the West Dry Well.

Lead and zinc were detected at low concentrations (0.007 and 0.20 mg/L, respectively), in samples from several wells located both upgradient and downgradient of the West Dry Well. Concentrations of these metals were generally higher in wells downgradient of the West Dry Well but are still below their respective MCLs.

## 1.6 Summary of Previous Ground-Water Level Data

Measurement of water levels in onsite and offsite ground-water monitoring wells indicate the water table occurs at a depth of approximately 65 to 70 feet, and 30 feet below ground surface, respectively. Seasonal water-table fluctuations in the monitoring wells are on the order of five feet, with the highest water-table elevations in the spring and the lowest in the fall. Ground-water flow beneath the site is to the northwest with a horizontal gradient of about 0.0017 ft/ft. Based on the differences in water levels measured in wells screened at different elevations, no consistent vertical gradient is apparent. Ground-water levels measured in January-February 1993 are shown on Figure 1-6. A summary of ground-water levels is provided in Table 1-4.

## Section 2

## TECHNICAL APPROACH FOR GROUND-WATER MONITORING

This section describes the technical approach for the ground-water monitoring, including the rationale for placement of each of the monitoring wells in the network.

### 2.1 Proposed Monitoring Well Locations

The proposed ground-water monitoring well network will consist of one upgradient well (MW1) and eight downgradient wells (MW9U, MW9L, MW10, MW11, MW18, MW19, MW20 and MW21). The proposed monitoring network would include five existing wells, two replacement wells (MW20 and MW21), and two new downgradient wells (MW18 and MW19). Figure 2-1 shows the proposed monitoring well network.

As may be seen in Figure 1-6, monitoring well MW1 is located hydraulically upgradient of the source area for PCBs. The water quality in this well may be considered representative of background. This upgradient well will allow a comparison of background water quality with that of ground water beneath the site, and therefore will be retained in the new monitoring network.

The remaining eight wells may be considered either downgradient or cross-gradient of the source area. New well MW21 and existing well MW10 are considered to be cross-gradient wells because of the narrow areal extent of PCBs and the lack of historical variations in the ground-water flow direction. However, if the ground-water flow direction should change, MW21 and MW10 would be useful for monitoring potential changes in PCB concentrations resulting from a more northerly or westerly direction of ground-water flow, respectively. Therefore, these wells will be included in the new network.

The remaining wells proposed for the monitoring network (MW9U, MW9L, MW11, MW18, MW19, and MW20) are considered to be downgradient of the source area. These wells will be utilized to monitor the performance of the cleanup action and to act as an early warning system for migration of PCBs in ground water, immediately downgradient and at some distance from the source area. All of the monitoring wells proposed for the monitoring network will be utilized for ground-water level measurements.

Thirteen existing monitoring wells will be abandoned following Washington State well abandonment procedures as described in Section 3.1.5. Monitoring wells MW2, MW4, MW5, MW6, and MW8 will be abandoned because of their close proximity to the planned soil cleanup areas. Wells MW5 and MW8 (with detected PCB concentations) will be replaced with a single new well, MW20, located approximately ten feet north of the present location of MW5. Well MW20 will be installed after all soil cleanup activities are complete and all danger of potential well damage is eliminated. Well MW19 will be installed approximately midway between the source area and MW11, which represents the downgradient extent of PCBs in ground water. This will aid in determining the concentration gradient of PCBs in ground water. Well MW19 will also be installed after all soil cleanup activities are completed.

Well MW4 will be replaced by MW21, after soil cleanup activities are completed, because samples from MW4 have historically had turbidity values greater than 5 nephelometric turbidity units (NTUs). As recommended in the *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document* (*U. S. EPA, 1986*), this well is unsuitable for monitoring due to the high turbidity. The screened section of the new well will be filter packed, unlike the present MW4, which should lower the turbidity of the samples.

Monitoring wells MW12, MW13, MW14, MW15, MW16, and MW17 will be abandoned because PCBs have never been detected in samples from these wells and ground water at these locations is in compliance with cleanup levels. Additionally, continuing ground-water sampling at these locations would not be cost effective as a means of monitoring the performance of the cleanup action over the long-term.

Ground water from monitoring well MW3 may be considered upgradient or far cross-gradient of the source of chemicals in ground water. This well is currently in compliance with cleanup levels. Well MW3 would not be useful for compliance monitoring, and therefore, will not be retained as part of the monitoring network.

PCBs have never been detected in samples from well MW7. Ground water from this well is in compliance with cleanup levels and the well is redundant to MW4, with respect to depth of monitored interval and direction from the source. For these reasons, MW7 will be abandoned.

The Golder Associates, Inc., river gaging station, located along the Spokane River, will be removed as it is not necessary for the ground-water monitoring network.

Wells MW2, MW4 and MW5 will continue to be sampled as part of the monitoring network until such time that it becomes necessary to abandon them because of their interference with the soil cleanup excavation. Monitoring Wells MW19, MW20 and MW21 will then be installed as soon as the excavations are backfilled in order to avoid missing a quarterly sampling round. Table 2-1 outlines the schedule of well abandonment and subsequent well installation planned in order to attain the final monitoring well network.

## 2.2 Ground-Water Analyses

All monitoring wells in the network will be sampled quarterly. Ground-water samples will be analyzed quarterly for PCBs using modified U.S. EPA Method 608 with a detection limit of 0.05 μg/L. The ground-water samples will be analyzed annually for TPH using U.S. EPA Method 418.1 and for volatile organic compounds by the Contract Laboratory Program Routine Analytical Services (CLP RAS). Monitoring wells will be sampled on a quarterly schedule for a five-year period, after which the monitoring program will be re-evaluated by WDOE.

## 2.3 Site Access

The ground-water monitoring wells in the proposed network are located both onsite and offsite in areas of different ownership, but similar terrain. All monitoring activities and access to monitoring wells will be coordinated with WDOE.

## Section 3

## PROPOSED GROUND-WATER MONITORING WELL NETWORK

This section describes procedures for the installation, development, and abandonment of the monitoring wells. Procedures for monitoring well sampling are provided in the Ground-Water Sampling and Analysis Plan, and are summarized in Section 3.2.

### 3.1 Monitoring Well Construction and Abandonment

The monitoring well network will consist of nine monitoring wells, five of which are currently in operation. New monitoring wells MW18, MW19, MW20 and MW21 will be constructed and thirteen wells will be abandoned according to the schedule in Table 2-1. At a minimum, *Chapter 173-160 Washington Administrative Code (WAC) Minimum Standards for Construction and Maintenance of Water Wells (WDOE, 1988)* will be followed during the drilling, installation, development, and abandonment of the monitoring wells.

#### 3.1.1 Monitoring Well Drilling

A State of Washington licensed well driller will be contracted to perform the borehole drilling, well installation and well development. The procedures to be followed during the drilling of the well boreholes include the following:

- Equipment decontamination;
- Rig setup and borehole drilling; and
- Containment of borehole cuttings and formation water.

A hydrogeologist will be onsite during all drilling activities to record the soil and stratigraphy encountered, to supervise the drilling, and to design and supervise the well installation and development. The hydrogeologist will be responsible for the maintenance of all records and chain-of-custody procedures.

Equipment Decontamination

Equipment will be cleaned to remove any contaminants on the drilling equipment upon mobilization to the site. All drilling equipment will also be properly cleaned prior to use at each well site. Equipment cleaning will be performed as stated in the Quality Assurance Project Plan. Care will be taken to prevent any cross-contamination from one drilling location to another.

Rig Setup and Borehole Drilling

The four new wells will be drilled using the air-rotary casing hammer drilling technique. This technique was used during the remedial investigations with success in maintaining the integrity of the borehole and reducing the potential for downward migration of chemicals during drilling operations.

The air-rotary casing hammer method employs a drill rig with an air compressor and a pneumatic system to advance the hole. Casing is driven from above ground surface with a pneumatic hammer while a percussion rock bit reams and cleans the hole of soil. The drive casing is advanced simultaneously with the hole, thereby ensuring an open hole during drilling and ensuing well installation, and preventing downward cross-contamination.

Return circulation from drilling, consisting of air and soil cuttings, is discharged above ground surface through the discharge head and channeled through a flexible hose to a cyclone, where the cuttings are misted with water and collected in containers.

During drilling of the monitoring wells, cutting samples for the purpose of lithologic description will be collected at five-foot intervals and drive samples will be obtained at the discretion of the field hydrogeologist. The hydrogeologist will construct a detailed geologic log for each borehole. The geologic log will consist of a description of each stratigraphic unit encountered and other data as described in Section 7.4.3 of the Quality Assurance Project Plan. A sample geologic log form can be found in Appendix A of the Quality Assurance Project Plan.

Containment of Borehole Cuttings and Formation Water

Drill cuttings and formation water from each well borehole will be collected and stored in U.S. Department of Transportation (DOT) 17H or 17E 55-gallon drums, and handled as described in the Investigative and Project Waste Management Plan. Care will be taken to avoid any release of potentially chemical-containing materials to the ground or air surrounding the drill site or in areas of transport.

### 3.1.2 Monitoring Well Installation

The proposed design for the new monitoring wells is provided in Figure 3-1. The well screens will be ten feet long and will be positioned such that the top of the screens approximately coincide with the highest historical water level. This planned screen length is consistent with the wells currently in place at the site.

The ground-water monitoring wells will be constructed of 2-inch diameter well screen and riser casing. The well screen will be stainless steel wire-wrapped type with 0.02-inch slots and will be flush coupled to stainless steel riser casing extending to 10 feet above the water table. Above the water table, schedule 40 PVC will be installed to the ground surface.

The filter pack will consist of 10/20 Colorado silica sand and will extend three feet above the well screen. A three-foot well seal consisting of bentonite pellets or chips will be tremied on top of the filter pack and will be topped with cement/bentonite grout, which will fill the remaining well annulus to ground surface.

The filter pack, well seal, and grout will be placed in stages inside the drive casing during casing removal. This will prevent the borehole from caving in on the well assembly during construction. The surface completion will consist of a lockable steel casing set approximately three feet into the ground and extending two feet above the ground. Protective steel posts will be placed around a 2 foot by 2 foot concrete surface pad to protect the wellhead from inadvertent damage.

### 3.1.3 Monitoring Well Development

The new monitoring wells will initially be developed by surging with a stainless steel bailer, after allowing 72 hours for the cement-bentonite grout to cure. Bailing is effective in removing silt and sand from the bottom of the well. Bailing will continue until all silt- and sand-sized particles are removed from within the well sump.

The monitoring wells will be further developed by pumping with the Hydrostar sampling pumps, which will be installed following bailing. Pumping shall continue until all physical parameters (pH, temperature, electrical conductivity, and turbidity) stabilize (within 10 percent for three consecutive readings) and at least three well volumes of water are removed.

Appendix A of the Quality Assurance Project Plan contains a sample of the well development form which will be used to record the development activities.

### 3.1.4 Dedicated Pump Installation

The Hydrostar pump system or an equivalent system will be installed in the four new wells after the wells are surged and all fines are removed by bailing. The pumps shall be salvaged from wells slated to be abandoned and shall be factory refurbished before installation in the new wells. The wells from which the pumps are to be salvaged have never yielded samples with detectable concentrations of PCBs, so there is no potential for cross-contamination through re-use of the pumps.

### 3.1.5 Monitoring Well Abandonment

All procedures in *WAC 173-160-560 Standards for Construction and Maintenance of Wells (WDOE, 1988)*, will be followed for well abandonment. The well casing will be backfilled with cement/bentonite grout from the bottom of the well to ground surface. Then, the PVC riser casing will be cut off five feet below ground surface and the protective casing, posts and concrete pads will be removed. All abandonment procedures will be recorded on required forms and be submitted to the WDOE within thirty days after abandonment.

## 3.2 Ground-Water Sampling

Ground-water sampling will be conducted as described in the Ground-Water Sampling and Analysis Plan. The samples will be sent to a laboratory for analyses as described in Section 2.2. Procedures for ground-water sampling and associated activities are summarized below.

### 3.2.1 Sampling Procedures

Water-level measurements will be taken in each well prior to purging and sampling. The measurements will be made from a permanently marked reference point on the PVC well casing. Measurements will be made using an electric probe and will be recorded to the nearest hundredth of a foot.

Prior to collecting ground-water samples, each well will be purged of a minimum of three well volumes of water until clear, silt-free water is produced. Field measurements of the indicator parameters (temperature, pH, electrical conductivity, and turbidity) will be measured and recorded during purging and prior to sampling to ensure representative formation water is collected. The Hydrostar Model HS8000 dedicated pumps will be used to purge and sample the wells. Figure 3-2 is a schematic of the Hydrostar HS 8000 wellhead assembly. Well water will be pumped at a rate of approximately 2 gallons per minute (gpm) while the parameters are being measured and until all parameters stabilize within ten percent for three consecutive readings.

Ground-water samples will be collected immediately following purging and will be placed directly into containers appropriate for the type of analyses to be performed.

Details of the sampling procedure followed at each well will be entered in a field notebook and a well sampling record (see Appendix A of the Quality Assurance Project Plan).

### 3.2.2 Disposal of Purged Ground Water

Details regarding the management of purged ground water are provided in the Investigative and Project Waste Management Plan. Purged ground water will be contained and transported in DOT 17E drums to the designated storage area. The ground water will then be treated with activated carbon, which will provide a high PCB removal efficiency. Treated ground water will be placed in a holding tank until analysis results show nondetectable PCB concentrations. Then, it will be discharged to the ground upgradient of the West Dry Well.

## Section 4

## REPORTING OF MONITORING RESULTS

Quarterly ground-water monitoring will commence in late 1993 and the first Ground-Water Compliance Monitoring Report will be due April 30, 1994.

The results from the quarterly ground-water sampling events will be tabulated and included in three quarterly reports and one annual report per year. The reports will contain a description of activities that took place during each sampling event, tables displaying analytical results for PCBs, TPH, volatile organic compounds, and water levels, a potentiometric map, hydrographs of the wells, and graphs displaying time versus PCB concentrations and turbidity values. Laboratory data sheets, along with validation and quality control sample results, will be appended to the report.

Ground-water quality data and ground-water level data will be stored in an electronic database. Details regarding the management of ground-water data are provided in the Data Management Plan. Information contained in the database will be submitted to WDOE on two diskette copies, along with a backup hard copy.

## Section 5

## REFERENCES


Bechtel National, Inc., 1986a, *Phase 1 Field Investigation, East 4323 Mission Avenue, Spokane, Washington:* Report to General Electric Company.

Bechtel National, Inc., 1986b, *Field Investigation Report, North Warehouse, Spokane, Washington:* Report to General Electric Company.

Bechtel National, Inc., 1987, *Phase 2 Field Investigation, East 4323 Mission Avenue, Spokane, Washington:* Report to General Electric Company.

Bechtel Environmental, Inc., 1991a, *Report of Phase 4 Remedial Investigation and Interim Actions at the former General Electric Spokane Facility:* Report to General Electric Company.

Bechtel Environmental, Inc, 1991b, *Report of In Situ Vitrification Demonstration Test Preparation Activities at the former General Electric Spokane Facility:* Report to General Company.

Bechtel Environmental, Inc., 1992, *Feasibility Study Report for the former General Electric Facility, Spokane Washington:* Report to General Electric Company.

Everest Consulting Associates, Inc., 1992, *Baseline Risk Assessment: Mission Avenue Site:* Report to General Electric Company.

Golder Associates, Inc., 1988, *Phase 3 Remedial Investigation, East 4323 Mission Avenue, Spokane, Washington:* Report to General Electric Company.

Golder Associates, Inc., 1992, *Phase 5 Remedial Investigation Report, East 4323 Mission Avenue, Spokane, Washington:* Report to General Electric Company.

U. S. Environmental Protection Agency, 1986, *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document*: Office of Waste Programs Enforcement and Emergency Response, OSWER-9950.1.

Washington Department of Ecology, 1988, *Minimum Standards For Construction And Maintenance Of Wells:* Chapter 173-160, Washington Administrative Code (May 5, 1988).

Washington Department of Ecology, 1993a, *Final Cleanup Action Plan for the General Electric Spokane Site,* March 29, 1993.

Washington Department of Ecology, 1993b, *GE/Spokane Consent Decree,* August 25, 1993.

TABLES

# TABLES

## TABLE 1-1

## CROSS-REFERENCE TO CONSENT DECREE REQUIREMENTS

| *Consent Decree Requirement* | *Section* |
|---|---|
| Goals of Cleanup Action. | 1.2 |
| A description and design of monitoring systems to be used in the monitoring effort. | 2.2 |
| Maps depicting the characteristics, quantity, and location of ground water to be monitored. | Appendix A & Figure 1-4 |
| A summary of all available chemical and physical characterization data gathered to date to support the proposed monitoring plan. | Appendix A & Table 1-2 |
| Additional information, as needed, regarding health and safety, applicable sate, federal, and local requirements, and property access issues. | 2.4 & Health and Safety Plan |
| Monitoring well construction, development, and testing standards, to include (Ch. 173-160 WAC). | 3 |
| Equipment and procedures for physical parameter testing. | 3.1.3 & 3.2.1 |
| Well construction material and sampling material compatability analysis. | 3.1.2 |
| Description of drilling methods, including well completion and development methods. | 3.1 |
| Proposed chemical sample extraction method and equipment description. | 3.2 |

**TABLE 1-2**

**MONITORING WELL CONSTRUCTION DETAILS**

| *WELL NO.* | *REFERENCE POINT ELEVATION (ft MSL)* | *WELL DEPTH (ft)* | *WELL DIAM. (in)* | *CASING MATERIAL* | *SCREEN MATERIAL* | *SLOT SIZE (in)* | *SCREEN INTERVAL (ft)* |
|---|---|---|---|---|---|---|---|
| MW-1 | 1959.13 | 79.00 | 4 | Sch. 40 PVC/Stainless | Stainless Steel | 0.04 | 1893.15-1883.15 |
| MW-2 | 1956.46 | 73.00 | 4 | Sch. 40 PVC/Stainless | Stainless Steel | 0.04 | 1893.62-1883.62 |
| MW-3 | 1957.96 | 73.10 | 4 | Sch. 40 PVC/Stainless | Stainless Steel | 0.04 | 1891.80-1881.80 |
| MW-4 | 1953.93 | 69.80 | 4 | Sch. 40 PVC/Stainless | Stainless Steel | 0.04 | 1891.00-1881.00 |
| MW-5 | 1957.14 | 72.10 | 4 | Sch. 40 PVC/Stainless | Stainless Steel | 0.04 | 1892.20-1882.20 |
| MW-6 | 1955.56 | 117.10 | 2 | Sch. 40 PVC/Stainless | Stainless Steel | 0.02 | 1853.63-1838.63 |
| MW-7A | 1952.80 | 80.70 | 2 | Sch. 40 PVC/Stainless | Stainless Steel | 0.02 | 1894.91-1879.91 |
| MW-8 | 1956.12 | 80.00 | 2 | Sch. 40 PVC/Stainless | Stainless Steel | 0.02 | 1893.43-1878.43 |
| MW-9 (upper) | 1952.00 | 120.30 | 2 | Sch. 40 PVC/Stainless | Stainless Steel | 0.02 | 1836.07-1831.07 |
| MW-9 (lower) | 1952.02 | 159.70 | 2 | Sch. 40 PVC/Stainless | Stainless Steel | 0.02 | 1802.67-1792.67 |
| MW-10 | 1954.93 | 78.50 | 2 | Sch. 40 PVC/Stainless | Stainless Steel | 0.02 | 1891.05-1876.05 |
| MW-11 | 1951.93 | 81.50 | 2 | Sch. 40 PVC/Stainless | Stainless Steel | 0.02 | 1890.14-1875.14 |
| MW-12 | 1922.25 | 44.05 | 2 | Sch. 40 PVC/Stainless | Stainless Steel | 0.02 | 1890.75-1875.75 |
| MW-13 | 1922.39 | 43.27 | 4 | Sch. 40 PVC/Stainless | Stainless Steel | 0.02 | 1891.96-1876.96 |
| MW-14 | 1911.87 | 31.30 | 2 | Sch. 40 PVC/Stainless | Stainless Steel | 0.02 | 1892.66-1877.66 |
| MW-15 | 1924.74 | 44.53 | 2 | Sch. 40 PVC/Stainless | Stainless Steel | 0.02 | 1893.05-1878.05 |
| MW-16 | 1926.95 | 47.30 | 4 | Sch. 40 PVC/Stainless | Stainless Steel | 0.02 | 1892.65-1877.65 |
| MW-17 | 1926.97 | 125.00 | 4 | Sch. 40 PVC/Stainless | Stainless Steel | 0.02 | 1819.19-1809.06 |

**TABLE 1-3**

**MAXIMUM CHEMICAL CONCENTRATIONS IN GROUND WATER**

| *CHEMICAL* | *MAXIMUM CONCENTRATION*(1) |
|---|---|
| PCBs (μg/L) | |
| Aroclor 1260 | 4.8 |
| "Total PCBs" | 7.7(2) |
| VOLATILE ORGANIC COMPOUNDS (μg/L) | |
| Benzene | 5.6 |
| Tetrachloroethene | 0.75 |
| Trichloroethane | 0.33 |
| Trichloroethene | 20 |
| Xylenes | 1.3 |
| CHLORINATED BENZENES (μg/L) | |
| 1,2,3,5-Tetrachlorobenzene | 2.6 (j) |
| TOTAL PETROLEUM HYDROCARBONS (μg/L) | 17 |
| OTHER ORGANICS (μg/L) | |
| Butylbenzylphthalate | 2 (j) |
| Diethylphthalate | 1 (j) |
| METALS (mg/L) | |
| Lead | 0.007 |
| Zinc | 0.20 |

Notes:

(1) For all sampling rounds, November 1986 to January 1993.
(2) A concentration of 150 μg/L was detected in a sample collected from MW8 on October 14, 1990. This concentration is thought to be anomalous.
(j) Estimated concentration below sample quantification limit.

TABLE 1-4

GROUND-WATER LEVELS (1)

| WELL | COORDINATES NORTHING | COORDINATES EASTING | REFERENCE ELEVATION | GROUND-WATER ELEVATION (FT MSL) 11/86 | 1/88 | 7/90 | 10/90 | 1/91 | 4/91 | 7/8/91 | 1/92 | 7/8/92 | 1/2/93 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW1 | 9873.4 | 10192.1 | 1959.13 | 1889.87 | 1889.61 | 1892.71 | 1889.65 | 1892.55 | 1894.43 | 1890.71 | 1890.61 | 1888.38 | 1889.90 |
| MW2 | 9999.3 | 10017.0 | 1956.46 | 1889.65 | 1889.39 | 1892.42 | 1889.41 | 1892.46 | 1894.31 | 1890.52 | 1890.42 | 1888.15 | 1889.63 |
| MW3 | 9844.4 | 9919.0 | 1957.96 | 1889.56 | 1889.30 | NM | 1889.39 | 1892.29 | 1894.13 | 1890.45 | 1890.32 | 1888.07 | 1889.51 |
| MW4 | 10076.5 | 9878.2 | 1953.93 | 1889.35 | 1889.11 | NM | 1889.18 | 1892.05 | 1893.93 | 1890.20 | 1890.13 | 1887.83 | 1889.43 |
| MW5 | 9957.0 | 9998.9 | 1957.14 | 1889.68 | 1889.42 | 1892.57 | 1889.50 | 1892.40 | 1894.25 | 1890.56 | 1890.45 | 1888.20 | 1889.66 |
| MW6 | 9954.0 | 10034.7 | 1955.56 | NM | 1889.35 | 1891.56 | 1889.61 | 1892.35 | 1894.39 | 1890.42 | 1890.32 | 1888.06 | 1889.58 |
| MW7 | 10167.8 | 9894.0 | 1952.8 | NM | 1888.89 | NM | 1889.02 | 1891.89 | 1893.70 | 1889.89 | 1889.83 | 1888.29 | 1889.19 |
| MW8 | 9956.0 | 10025.7 | 1956.12 | NM | 1889.47 | 1891.79 | 1889.03 | 1894.54 | 1894.40 | 1890.56 | 1890.47 | 1888.17 | 1889.74 |
| MW9U | 10064.3 | 9809.6 | 1952.00 | NM | 1888.90 | NM | 1889.27 | 1891.94 | 1893.73 | 1890.02 | 1889.81 | 1887.64 | 1889.16 |
| MW9L | 10064.3 | 9809.6 | 1952.00 | NM | 1888.96 | NM | 1889.08 | 1892.02 | 1893.80 | 1890.08 | 1890.00 | 1887.68 | 1889.24 |
| MW10 | 9989.9 | 9807.3 | 1954.93 | NM | 1888.98 | NM | 1889.84 | 1892.03 | 1893.84 | 1890.11 | 1890.02 | 1887.72 | 1889.28 |
| MW11 | 10074.9 | 9809.2 | 1951.94 | NM | 1889.00 | 1887.14 | 1889.42 | 1892.04 | 1893.99 | 1890.12 | 1890.05 | 1887.76 | 1889.29 |
| MW12 | 10676.3 | 8548.8 | 1922.25 | NM | NM | NM | 1887.72 | 1891.60 | 1892.03 | 1888.27 | 1888.31 | 1886.15 | 1887.80 |
| MW13 | 10502.8 | 9153.7 | 1922.39 | NM | NM | NM | 1888.04 | 1890.62 | 1892.36 | 1888.78 | 1888.55 | 1886.58 | 1888.25 |
| MW14 | 11037.7 | 9566.3 | 1911.87 | NM | NM | NM | 1887.93 | 1892.77 | 1891.85 | 1888.49 | 1888.70 | 1886.43 | 1888.18 |
| MW15 | 10215.3 | 9154.4 | 1924.74 | NM | NM | NM | 1888.26 | 1891.24 | 1893.17 | 1889.30 | 1889.25 | 1887.01 | 1888.63 |
| MW16 | 10774.9 | 8963.2 | 1927.05 | NM | NM | NM | 1887.87 | 1890.38 | 1892.23 | 1888.63 | 1888.53 | 1886.30 | 1888.02 |
| MW17 | 10786.2 | 8974.8 | 1927.08 | NM | NM | NM | 1887.75 | 1890.36 | 1892.23 | 1888.37 | 1888.61 | 1886.27 | 1887.98 |

Notes:

NM = Not Measured
(1) Source: Golder, 1992, Tables 3-3 through 3-7

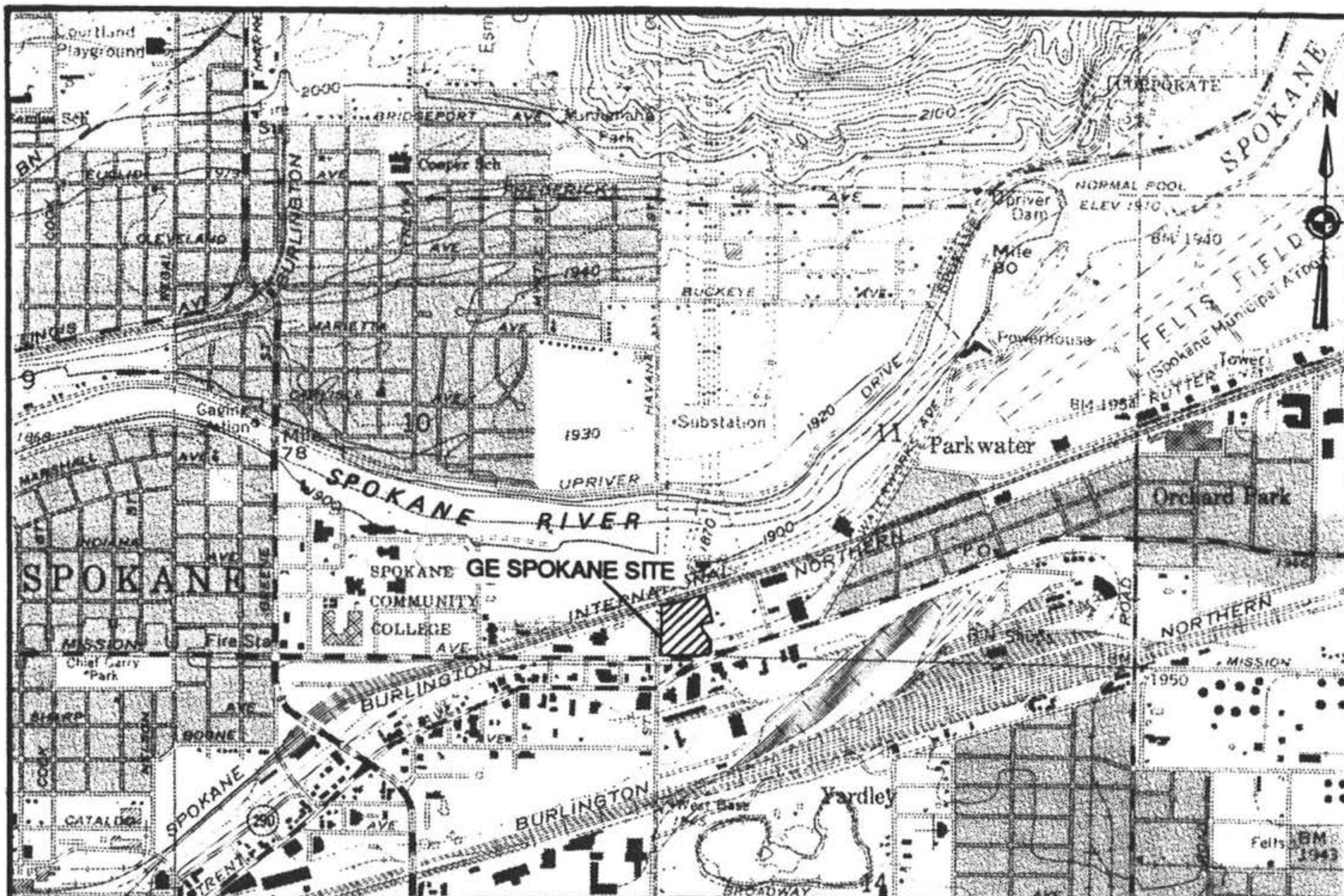
**TABLE 2-1**

**MONITORING WELL INSTALLATION AND ABANDONMENT SCHEDULE**

| *EXISTING / PROPOSED WELL* | *PLANNED ABANDONMENT DATE* | *REPLACEMENT WELL* | *PLANNED INSTALLATION DATE* |
|---|---|---|---|
| Wells to be Abandoned/Replaced | | | |
| MW2 | 11/93 | None | N/A |
| MW3 | 11/93 | None | N/A |
| MW4 | 4/95 | MW21 | 6/95 |
| MW5 | 4/95 | MW20 | 6/95 |
| MW6 | 11/93 | None | N/A |
| MW7 | 11/93 | None | N/A |
| MW8 | 4/95 | MW20 | 6/95 |
| MW12 | 11/93 | None | N/A |
| MW13 | 11/93 | None | N/A |
| MW14 | 11/93 | None | N/A |
| MW15 | 11/93 | None | N/A |
| MW16 | 11/93 | None | N/A |
| MW17 | 11/93 | None | N/A |
| Proposed New Wells | | | |
| MW18 | N/A | N/A | 11/93 |
| MW19 | N/A | N/A | 6/95 |

FIGURES

# FIGURES




0 2000 4000

SCALE IN FEET

**Bechtel**

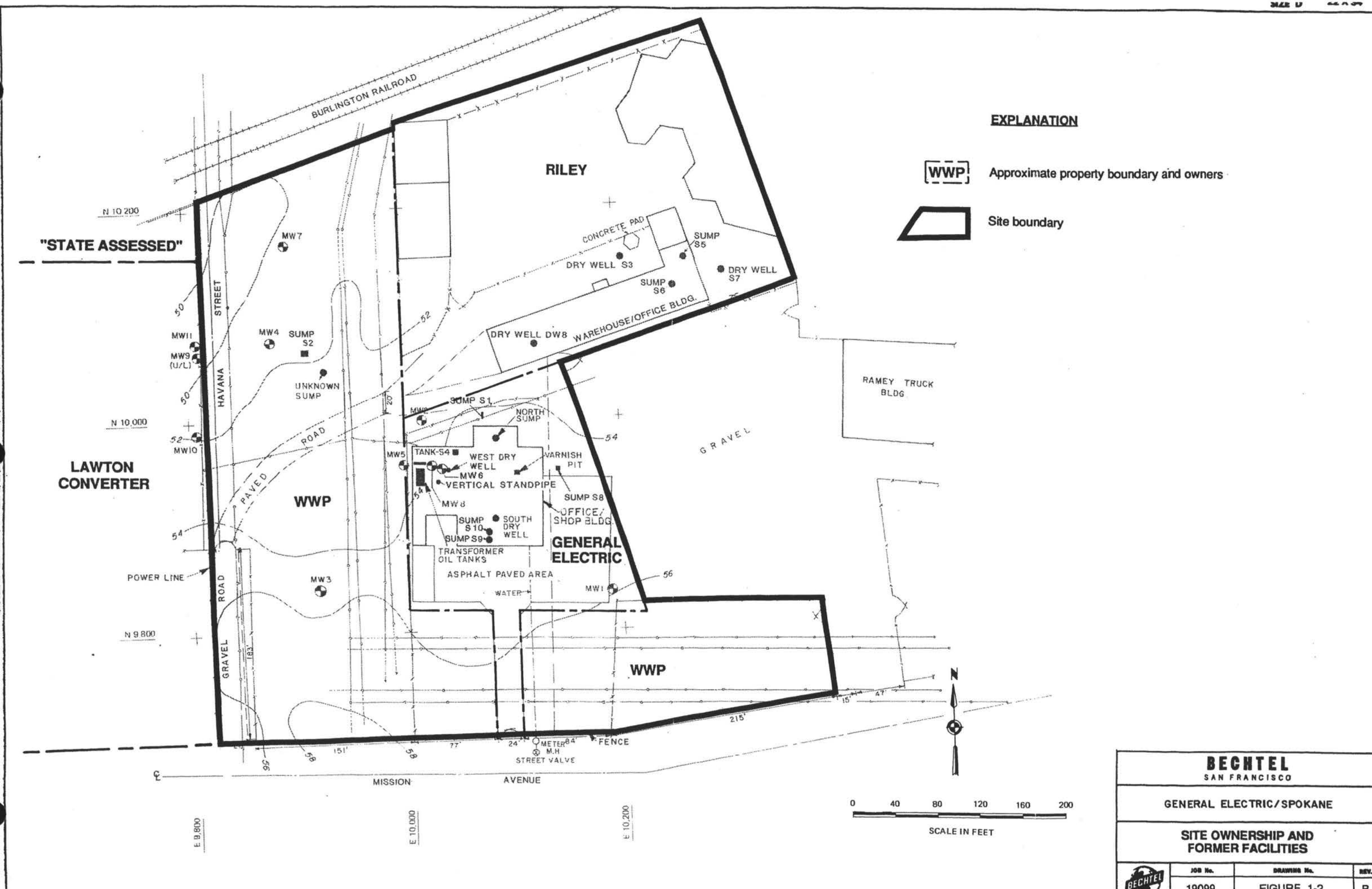
SAN FRANCISCO

GENERAL ELECTRIC/SPOKANE

**SITE LOCATION MAP**

| Job Number | Drawing No. |
|---|---|
| 19099 | FIGURE 1-1 |

GWMP-001-A
5/11/93



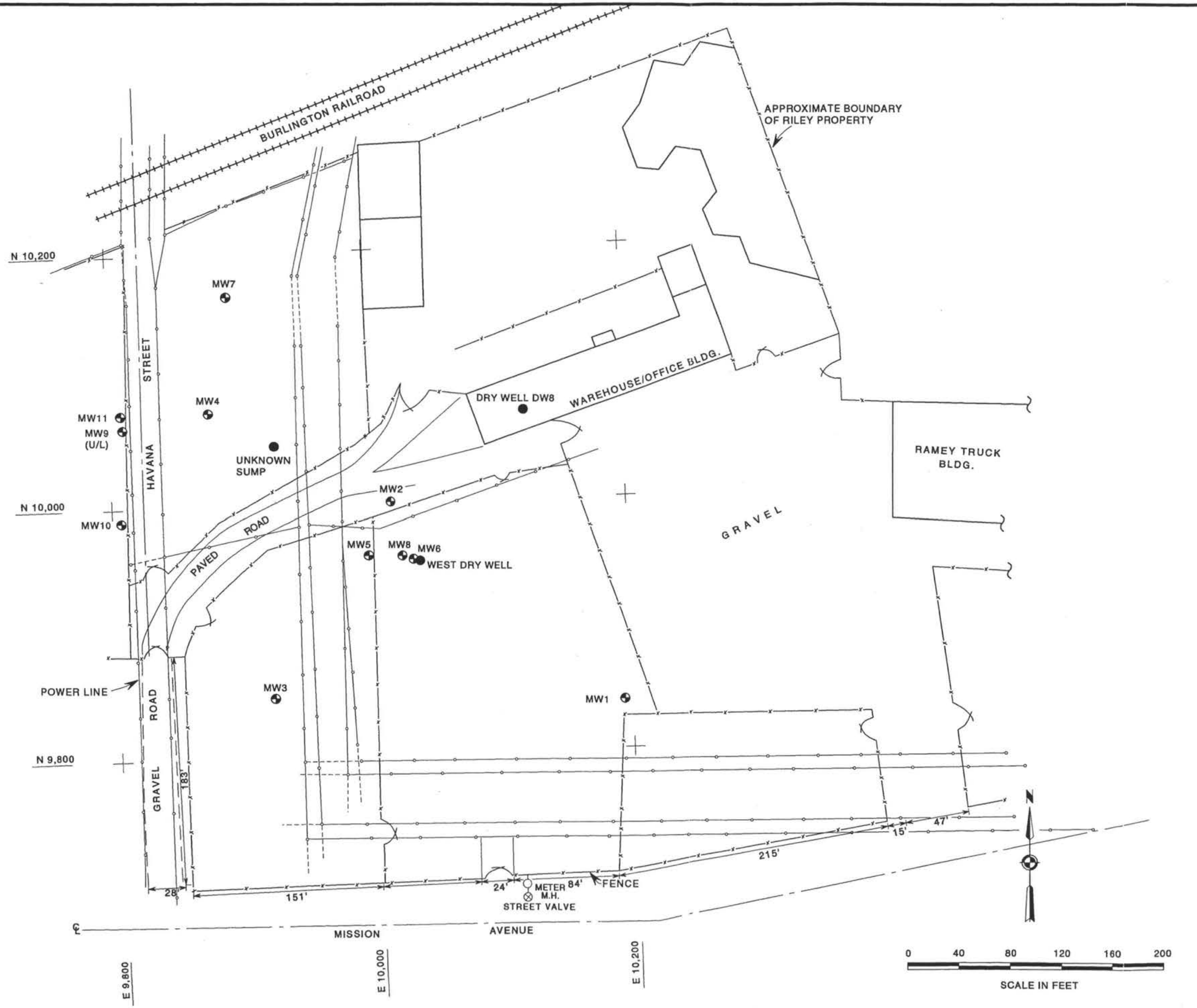

**BECHTEL**
SAN FRANCISCO

GENERAL ELECTRIC/SPOKANE

**SITE OWNERSHIP AND FORMER FACILITIES**

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 1-2 | B |

GWMP-002-B
8/17/93



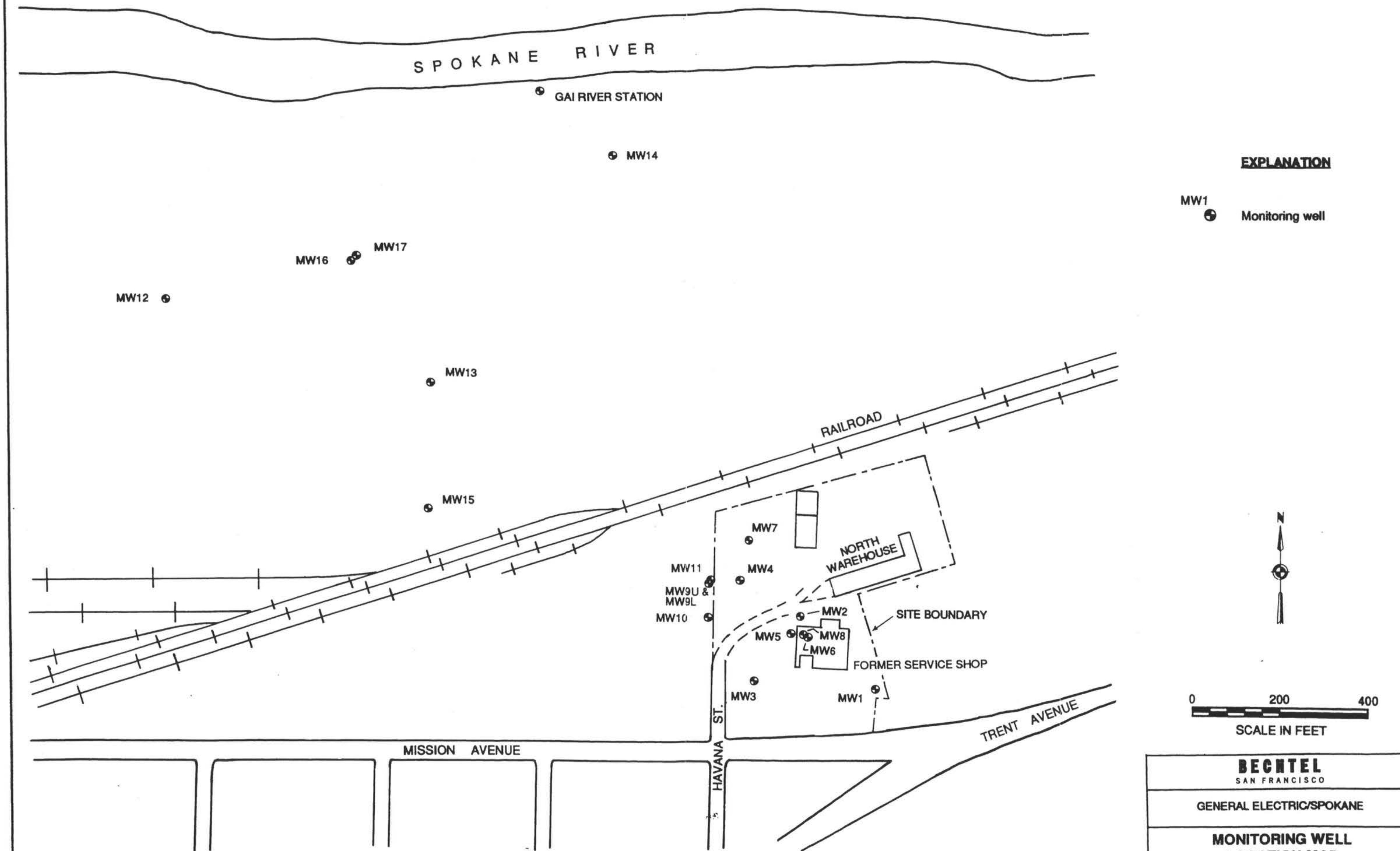

**Bechtel**
SAN FRANCISCO

GENERAL ELECTRIC/SPOKANE

**EXISTING SITE FEATURES**

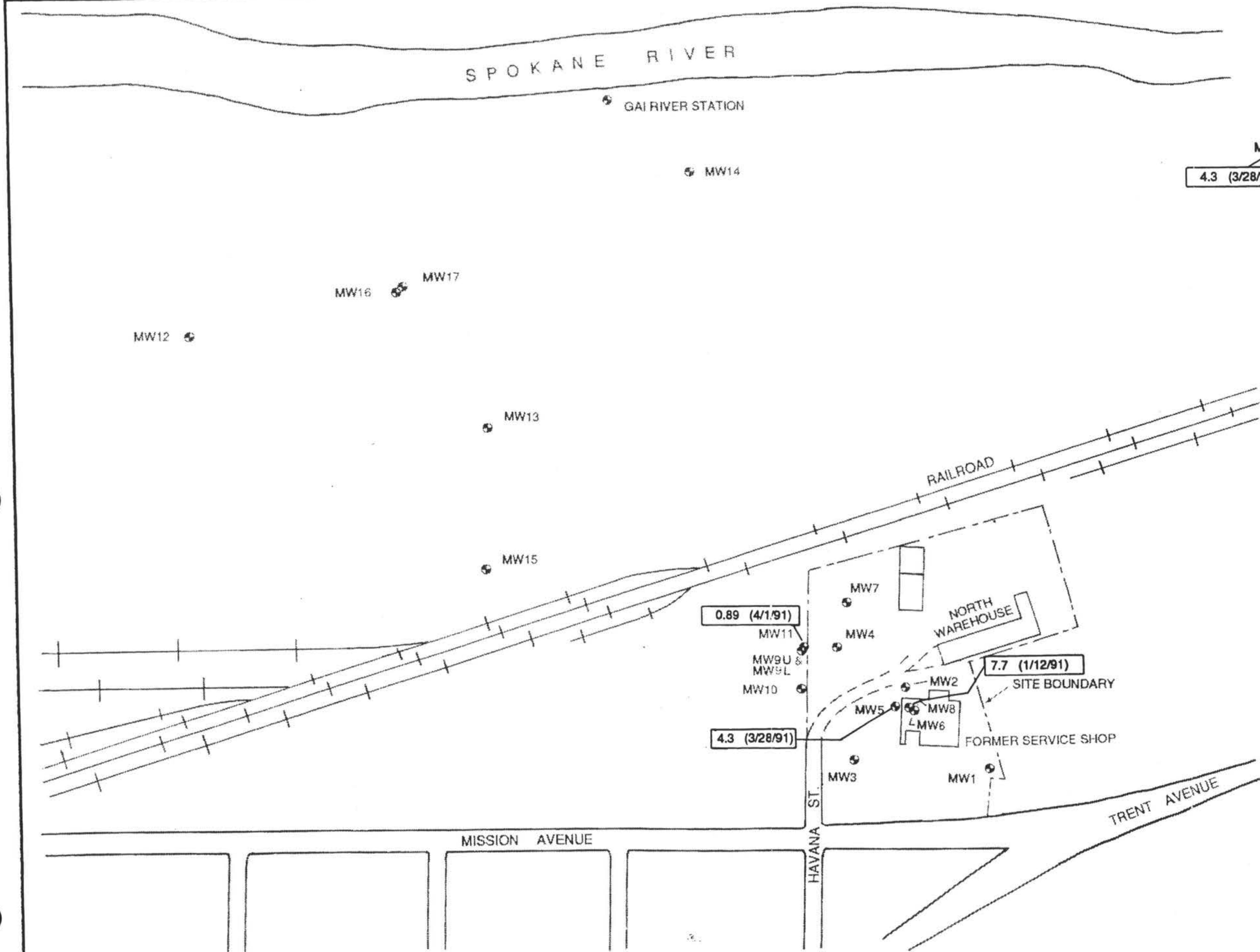
| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 1-3 | A |

GESP006da/RD_RA WP/GWMP/GWMP-009-A
8/18/93




| | | |
|---|---|---|
| BECHTEL SAN FRANCISCO | | |
| GENERAL ELECTRIC/SPOKANE | | |
| MONITORING WELL LOCATION MAP | | |
| JOB No. 19099 | DRAWING No. FIGURE 1-4 | REV. C |

GWMP-005-C
9/14/93




EXPLANATION

MW5 4.3 (3/28/91) Monitoring well showing maximum detected PCB concentration in µg/L and date sampled.

NOTE:

The anomalous PCB concentration in well MW8 on 10/14/90 is omitted here as it is not representative of site conditions.

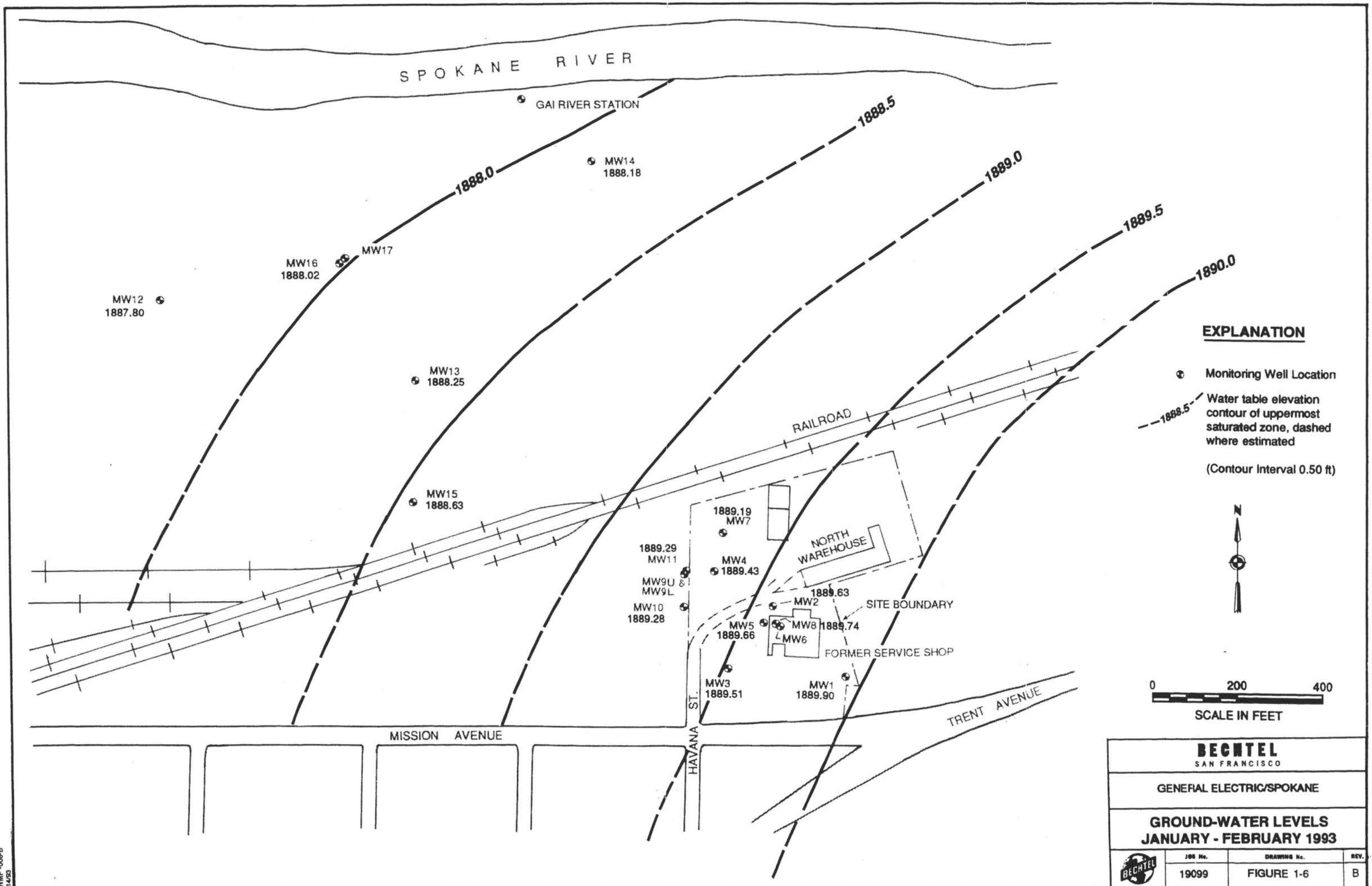
BECHTEL
SAN FRANCISCO

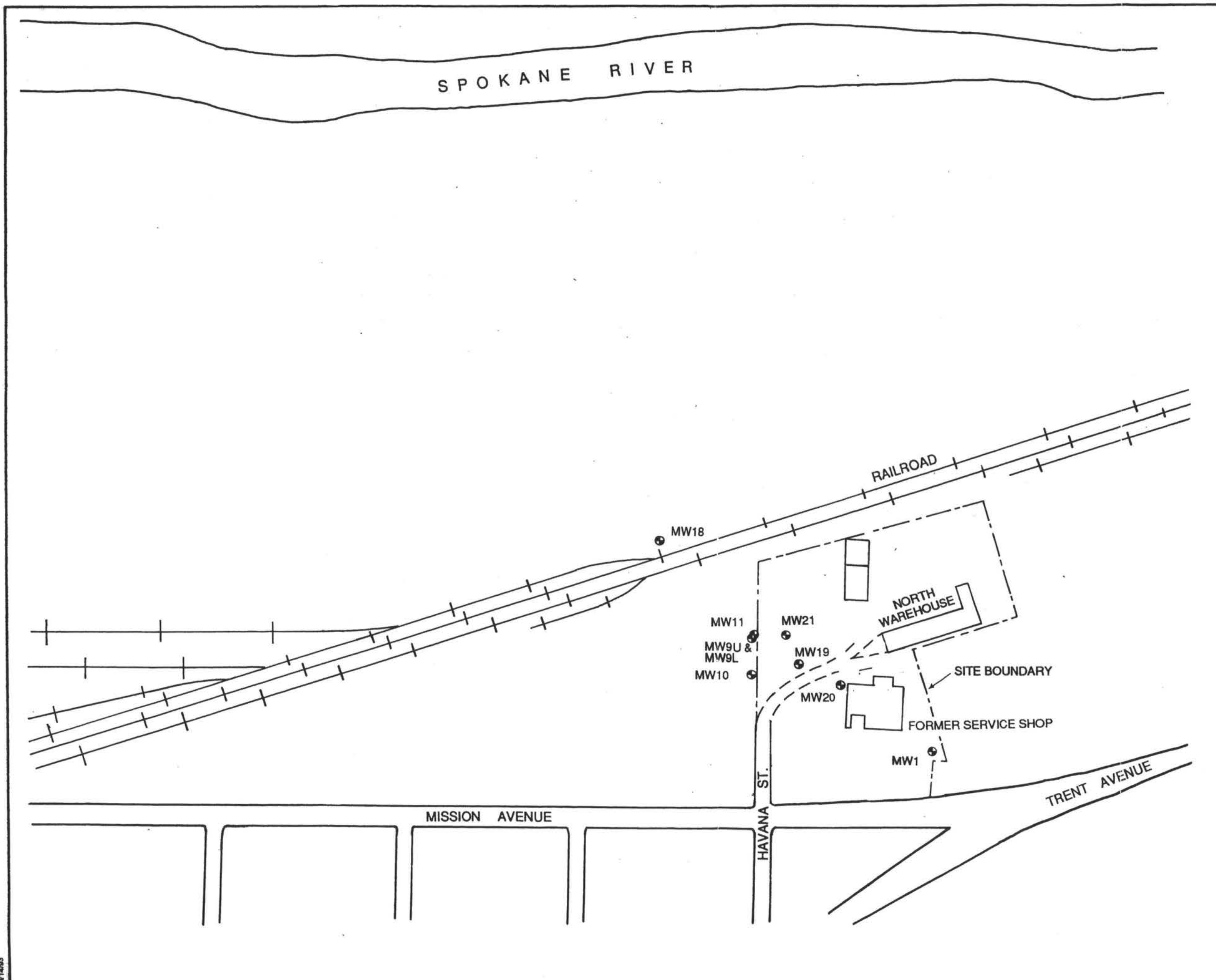
GENERAL ELECTRIC/SPOKANE

PCBs IN GROUND-WATER

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 1-5 | B |

GWMP-006-B
9/14/93


SPOKANE RIVER
GAI RIVER STATION
1888.5
1888.0
1889.0
1889.5
1890.0
MW14
1888.18
MW17
MW16
1888.02
MW12
1887.80
MW13
1888.25
MW15
1888.63
RAILROAD
1889.19
MW7
1889.29
MW11
MW4
1889.43
MW9U &
MW9L
NORTH WAREHOUSE
1889.63
MW2
SITE BOUNDARY
MW10
1889.28
MW5
1889.66
MW8 1889.74
MW6
FORMER SERVICE SHOP
MW3
1889.51
MW1
1889.90
MISSION AVENUE
HAVANA ST.
TRENT AVENUE
EXPLANATION
Monitoring Well Location
1888.5
Water table elevation contour of uppermost saturated zone, dashed where estimated
(Contour Interval 0.50 ft)
N
0
200
400
SCALE IN FEET
BECHTEL
SAN FRANCISCO
GENERAL ELECTRIC/SPOKANE
GROUND-WATER LEVELS
JANUARY - FEBRUARY 1993
JOB No.
DRAWING No.
REV.
19099
FIGURE 1-6
B
GWMP-008-B
9/14/93



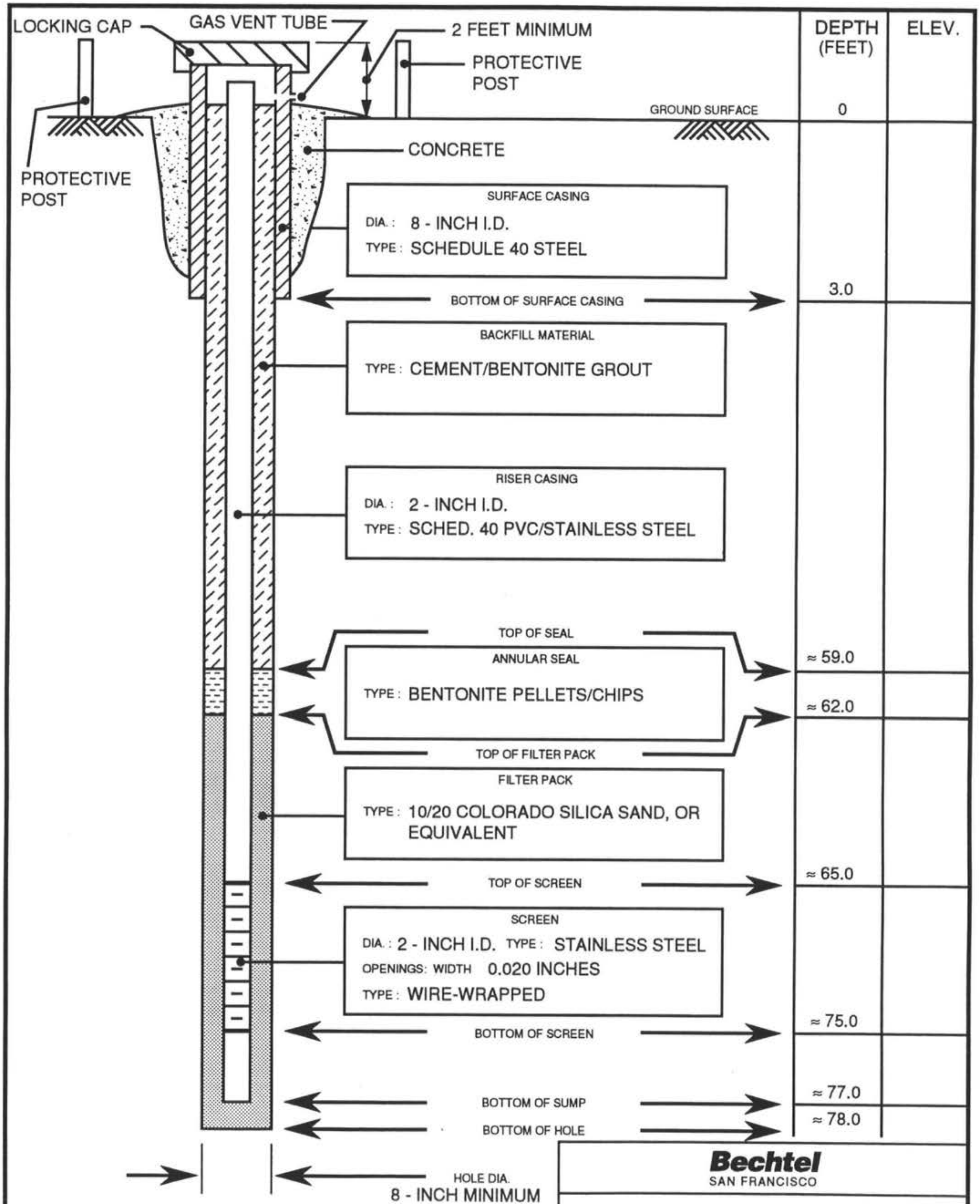

BECHTEL
SAN FRANCISCO

GENERAL ELECTRIC/SPOKANE

PROPOSED GROUND-WATER MONITORING NETWORK

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 2-1 | D |

GWMP-003-D
10/14/93




NOT TO SCALE

**Bechtel**
SAN FRANCISCO

GENERAL ELECTRIC/SPOKANE

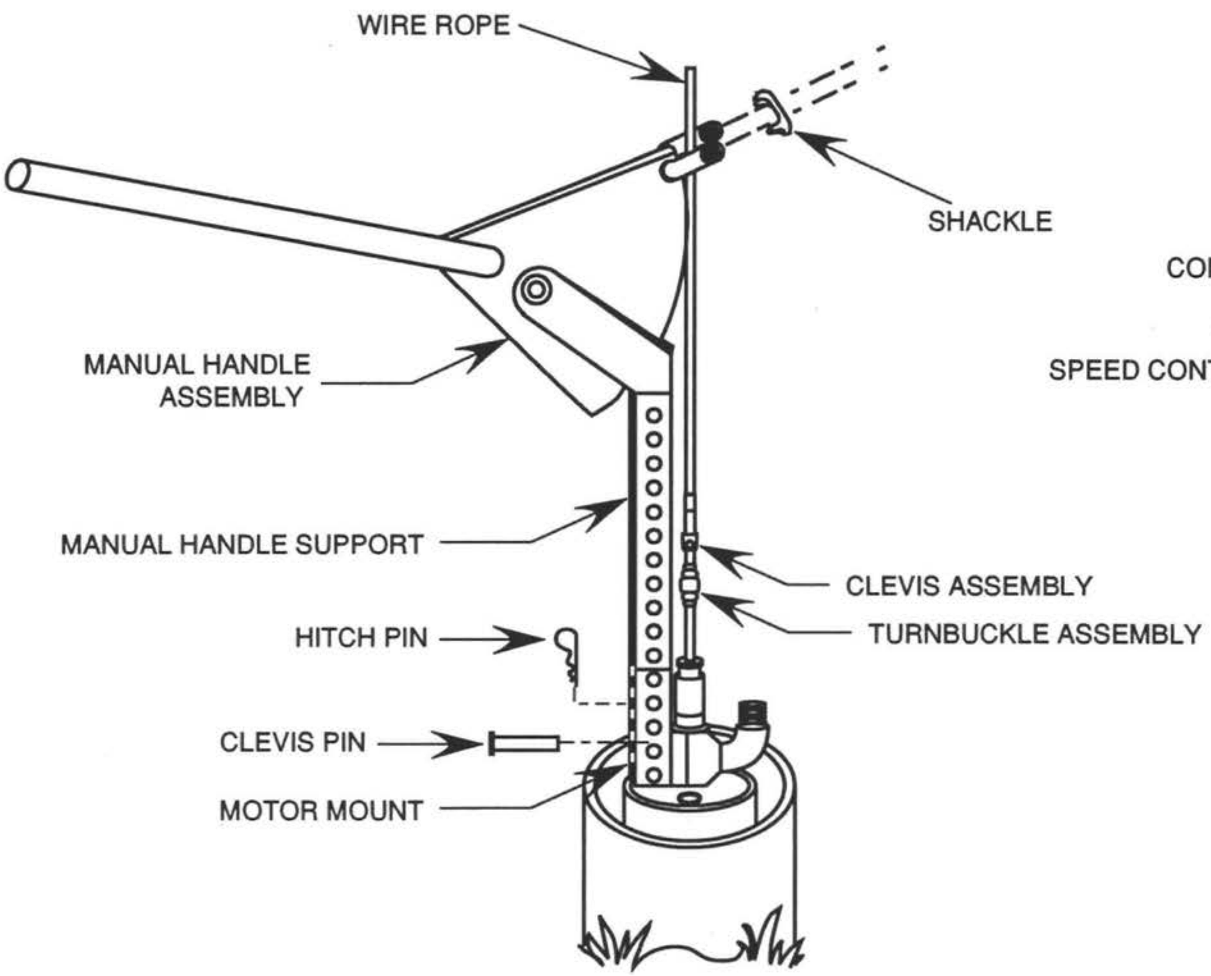
**MONITORING WELL COMPLETION DESIGN**

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 3-1 | C |

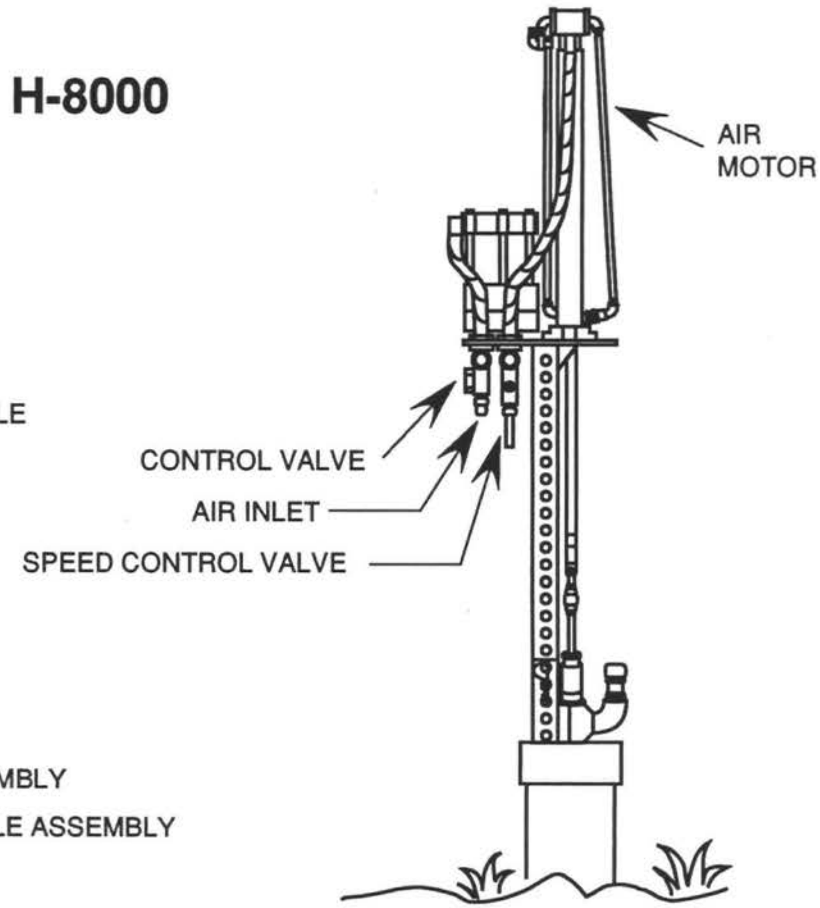
GESP009da/RD_RA WP/GWMP/GWMP-004-C
9/14/93

GESP002da/GWMP/GWMP-007-A
7/7/93

# HYDROSTAR H-8000




MANUAL OPERATION -
ABOVE GROUND COMPLETION




AUTOMATIC MOTOR ASSEMBLY -
ABOVE GROUND COMPLETION

| Bechtel SAN FRANCISCO | | |
|---|---|---|
| GENERAL ELECTRIC/SPOKANE | | |
| **SCHEMATIC OF DEDICATED SAMPLING PUMP** | | |
| Job Number | Drawing No. | Rev. |
| 19099 | FIGURE 3-2 | A |

APPENDICES

# APPENDIX A

## SUMMARY OF ANALYTICAL DATA

## TABLE OF CONTENTS

TABLE A-1

CHEMICALS IN GROUND WATER - WELL MW1

| | 11/14/86 | 1/18/88 | 7/9/90 | 10/13/90 | 1/10/91 | 3/28/91 | 8/5/91 | 1/92 | 7/28/92 | 1/27/93 |
|---|---|---|---|---|---|---|---|---|---|---|
| I. PCBs (µg/L) | | | | | | | | | | |
| Aroclor 1242 | ND 0.5 | ND 0.1 | ND 0.5 | ND 0.47 | ND 0.51 | ND 0.25 | ND 0.5 | NA | NA | NA |
| Aroclor 1254 | ND 0.5 | ND 0.1 | ND 0.5 | ND 0.47 | ND 0.51 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| Aroclor 1260 | ND 0.5 | ND 0.1 | ND 0.5 | ND 0.47 | ND 0.51 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| Total PCBs | NA | NA | ND | ND | ND | ND | NA | ND | NA | NA |
| II. VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | | | | |
| Benzene | ND 5.0 | ND 0.5 | ND 0.5 | ND 0.5 | NA | NA | NA | NA | NA | NA |
| Tetrachloroethene | ND 5.0 | 0.45 | ND 0.2 | ND 0.5 | NA | NA | NA | NA | NA | NA |
| Trichloroethane | ND 0.5[1] | ND 0.2 | ND 0.2 | ND 0.5[1] | NA | NA | NA | NA | NA | NA |
| Xylenes | NA | NA | 2.4 | ND 0.5[2] | NA | NA | NA | NA | NA | NA |
| Trichloroethene | ND 5.0 | ND 0.2 | ND 0.2 | ND 5 | NA | NA | NA | NA | NA | NA |
| III. CHLORINATED BENZENES (µg/L) | | | | | | | | | | |
| 1,2,3,5-Tetrachlorobenzene | NA | NA | NA | ND 10 | ND 0.008 | ND 0.002 | NA | NA | NA | NA |
| IV. TOTAL PETROLEUM HYDROCARBONS (µg/L) | NA | 0.06 | NA | ND 1000[4] | NA | NA | NA | NA | NA | NA |
| V. OTHER ORGANICS (µg/L) | | | | | | | | | | |
| Butylbenzylphthalate | NA | NA | NA | ND 10 | NA | NA | NA | NA | NA | NA |
| Diethylphthalate | NA | NA | NA | ND 10 | NA | NA | NA | NA | NA | NA |
| Total Organic Carbon | NA | NA | NA | 800[3] | NA | NA | NA | NA | NA | NA |
| Oil and Grease | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| VI. METALS (mg/L) | | | | | | | | | | |
| Lead | | | | | | | | | | |
| 5.0 mm | NA | 0.007 | NA | NA | NA | NA | NA | NA | NA | |
| 0.45 mm | NA | 0.002 | NA | NA | NA | NA | NA | NA | NA | NA |
| Zinc | | | | | | | | | | |
| 5.0 mm | NA | ND .01 | NA | NA | NA | NA | NA | NA | NA | NA |
| 0.45 mm | NA | 0.02 | NA | NA | NA | NA | NA | NA | NA | NA |
| VII. INORGANIC WATER QUALITY | | | | | | | | | | |
| pH | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| TDS (mg/L) | NA | NA | 173 | NA | NA | NA | NA | NA | NA | NA |
| TSS (mg/L) | NA | NA | ND 1.0 | NA | NA | NA | NA | NA | NA | NA |
| Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Nitrate (mg/L) | NA | NA | 1.616 | NA | NA | NA | NA | NA | NA | NA |
| Sulfate (mg/L) | NA | NA | 14.9 | NA | NA | NA | NA | NA | NA | NA |
| Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Silica (mg/L) | NA | NA | 13.42 | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = Not Detected
NA = Not Analyzed
(1) Neither 1,1,1- nor 1,1,2 - were detected
(2) Total Xylenes
(3) Reported as 0.8 mg/L
(4) Reported as ≤1 mg/L "Petroleum Hydrocarbons"

TABLE A-2

CHEMICALS IN GROUND WATER - WELL MW2

| | | 11/14/86 | 1/22/88 | 7/8/90 | 10/14/90 | 10/14/90D | 1/11/91 | 1/11/91D | 3/28/91 | 8/3/91 | 1/92 | 7/28/92 | 1/29/93 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I. | PCBs (µg/L) | | | | | | | | | | | | |
| | Aroclor 1242 | ND 0.5 | ND 0.1 | ND 0.5 | ND 0.47 | ND 0.5 | ND 0.51 | NA | ND 0.25 | ND 0.5 | NA | NA | NA |
| | Aroclor 1254 | ND 0.5 | ND 0.1 | ND 0.5 | ND 0.47 | ND 0.5 | ND 0.51 | NA | ND 0.49 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Aroclor 1260 | ND 0.5 | ND 0.1+ | ND 0.5 | ND 0.47 | ND 0.5 | ND 0.51 | NA | ND 0.49 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Total PCBs | NA | NA | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |
| II. | VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | | | | | | |
| | Benzene | ND 5.0 | ND 0.5 | ND 0.2 | ND 5.0 | NA | NA | NA | NA | NA | NA | NA | NA |
| | Tetrachloroethene | ND 5.0 | 0.75 | ND 0.2 | ND 5.0 | NA | NA | NA | NA | NA | NA | NA | NA |
| | Trichloroethane | ND 5.0 | 0.28 | ND 0.2 | ND 5.0 (1) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Xylenes | NA | NA | ND 0.5 | ND 5.0 (2) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Trichloroethene | 20 | ND 0.2 | ND 0.2 | ND 5.0 | NA | NA | NA | NA | NA | NA | NA | NA |
| III. | CHLORINATED BENZENES (µg/L) | | | | | | | | | | | | |
| | 1,2,3,5-Tetrachlorobenzene | NA | NA | NA | ND | NA | NA | NA | ND 0.002 | | NA | NA | NA |
| IV. | TOTAL PETROLEUM HYDROCARBONS (µg/L) | NA | 0.56 | ND 1000(4) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| V. | OTHER ORGANICS (µg/L) | | | | | | | | | | | | |
| | Butylbenzylphthalate | NA | NA | NA | ND 10 | ND 20 | NA | NA | NA | NA | NA | NA | NA |
| | Diethylphthalate | NA | NA | NA | ND 10 | ND 20 | NA | NA | NA | NA | NA | NA | NA |
| | Total Organic Carbon | NA | NA | NA | ND 500 (3) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Oil and Grease | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| VI. | METALS (mg/L) | | | | | | | | | | | | |
| | Lead | | | | | | | | | | | | |
| | 5.0 mm | NA | ND.002 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | ND.002 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Zinc | | | | | | | | | | | | |
| | 5.0 mm | NA | 0.08 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | 0.06 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| VII. | INORGANIC WATER QUALITY | | | | | | | | | | | | |
| | pH | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

Note:

ND = Not Detected
NA = Not Analyzed
D = Duplicate or split sample.
\+ = Suspected congeners present
(1) Neither 1,1,1- nor 1,1,2 - were detected
(2) Total Xylenes
(3) Reported as <0.5 mg/L
(4) Reported as <1 mg/L "Petroleum Hydrocarbons".

TABLE A-3

CHEMICALS IN GROUND WATER - WELL MW3

| | | 11/14/86 | 1/20/88 | 10/13/90 | 1/10/91 | 3/28/91 | 8/3/91 | 1/92 | 7/28/92 | 2/1/93 |
|---|---|---|---|---|---|---|---|---|---|---|
| I. | PCBs (µg/L) | | | | | | | | | |
| | Aroclor 1242 | ND 0.5 | ND 0.1 | ND 0.47 | ND 0.51 | ND 0.26 | ND 0.5 | NA | NA | NA |
| | Aroclor 1254 | ND 0.5 | ND 0.1 | ND 0.47 | ND 0.51 | ND 0.2 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Aroclor 1260 | ND 0.5 | ND 0.1 | ND 0.47 | ND 0.51 | ND 0.2 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Total PCBs | NA | NA | ND | ND | ND | NA | NA | NA | NA |
| II. | VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | | | |
| | Benzene | ND 5.0 | ND 0.5 | ND 5 | NA | NA | NA | NA | NA | NA |
| | Tetrachloroethene | ND 5.0 | ND 0.2 | ND 5 | NA | NA | NA | NA | NA | NA |
| | Trichloroethane | ND 5.0 | 0.23 | ND 5(1) | NA | NA | NA | NA | NA | NA |
| | Xylenes | NA | NA | ND 5(2) | NA | NA | NA | NA | NA | NA |
| | Trichloroethene | ND 5.0 | ND 0.2 | ND 5 | NA | NA | NA | NA | NA | NA |
| III. | CHLORINATED BENZENES (µg/L) | | | | | | | | | |
| | 1,2,3,5-Tetrachlorobenzene | NA | NA | ND 10 | NA | ND 0.008 | ND 0.002 | NA | NA | NA |
| IV. | TOTAL PETROLEUM HYDROCARBONS (µg/L) | NA | 0.95 | ND 1000(4) | NA | NA | NA | NA | NA | NA |
| V. | OTHER ORGANICS (µg/L) | | | | | | | | | |
| | Butylbenzylphthalate | NA | NA | ND 10 | NA | NA | NA | NA | NA | NA |
| | Diethylphthalate | NA | NA | ND 10 | NA | NA | NA | NA | NA | NA |
| | Total Organic Carbon | NA | NA | ND 500(3) | NA | NA | NA | NA | NA | NA |
| | Oil and Grease | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| VI. | METALS (mg/L) | | | | | | | | | |
| | Lead | | | | | | | | | |
| | 5.0 mm | NA | ND .002 | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | ND .002 | NA | NA | NA | NA | NA | NA | NA |
| | Zinc | | | | | | | | | |
| | 5.0 mm | NA | ND .01 | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | ND .01 | NA | NA | NA | NA | NA | NA | NA |
| VII. | INORGANIC WATER QUALITY | | | | | | | | | |
| | pH | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = Not Detected
NA = Not Analyzed
(1) Neither 1,1,1- nor 1,1,2 - were detected
(2) Total Xylenes
(3) Reported as 0.5 mg/L
(4) Reported as <1 mg/L "Petroleum Hydrocarbons".

TABLE A-4

CHEMICALS IN GROUND WATER - WELL MW4

| | | 11/14/86 | 1/21/88 | 10/13/90 | 1/13/91 | 3/27/91 | 8/3/91 | 1/92 | 7/30/92 | 1/30/93 |
|---|---|---|---|---|---|---|---|---|---|---|
| I. | PCBs (µg/L) | | | | | | | | | |
| | Aroclor 1242 | ND 0.5 | ND 0.1 | ND 0.5 | ND 0.52 | ND 0.25 | ND 0.5 | NA | NA | NA |
| | Aroclor 1254 | ND 0.5 | ND 0.1 | ND 0.5 | ND 0.52 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Aroclor 1260 | ND 0.5 | ND 0.1 | ND 0.5 | ND 0.52 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Total PCBs | NA | NA | ND | ND | ND | NA | NA | NA | NA |
| II. | VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | | | |
| | Benzene | ND 5.0 | ND 0.5 | ND 5 | NA | NA | NA | NA | NA | NA |
| | Tetrachloroethene | ND 5.0 | 0.28 | ND 5 | NA | NA | NA | NA | NA | NA |
| | Trichloroethane | ND 5.0 | 0.33 | ND 5(1) | NA | NA | NA | NA | NA | NA |
| | Xylenes | NA | NA | ND 5(2) | NA | NA | NA | NA | NA | NA |
| | Trichloroethene | ND 5.0 | ND 0.2 | NA | NA | NA | NA | NA | NA | NA |
| III. | CHLORINATED BENZENES (µg/L) | | | | | | | | | |
| | 1,2,3,5-Tetrachlorobenzene | NA | NA | ND 10 | ND 0.013 | ND 0.01 | ND 0.002 | NA | NA | NA |
| IV. | TOTAL PETROLEUM HYDROCARBONS (µg/L) | NA | 0.92 | ND 1000(4) | NA | NA | NA | NA | NA | NA |
| V. | OTHER ORGANICS (µg/L) | | | | | | | | | |
| | Butylbenzylphthalate | NA | NA | ND 10 | NA | NA | NA | NA | NA | NA |
| | Diethylphthalate | NA | NA | ND 10 | NA | NA | NA | NA | NA | NA |
| | Total Organic Carbon | NA | NA | 1000(3) | NA | NA | NA | NA | NA | NA |
| | Oil and Grease | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| VI. | METALS (mg/L) | | | | | | | | | |
| | Lead | | | | | | | | | |
| | 5.0 mm | NA | ND .002 | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | ND .002 | NA | NA | NA | NA | NA | NA | NA |
| | Zinc | | | | | | | | | |
| | 5.0 mm | NA | 0.01 | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | ND .01 | NA | NA | NA | NA | NA | NA | NA |
| VII. | INORGANIC WATER QUALITY | | | | | | | | | |
| | pH | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = Not Detected
NA = Not Analyzed
(1) Neither 1,1,1- nor 1,1,2 - were detected
(2) Total Xylenes
(3) Reported as 1.0 mg/L
(4) Reported as ≤1 mg/L "Petroleum Hydrocarbons".

TABLE A-5

CHEMICALS IN GROUND WATER - WELL MW5

| | | 11/14/86 | 1/23/88 | 1/23/88D | 7/7/90 | 10/14/90 | 1/11/91 | 1/11/91D | 3/28/91 | 8/3/91 | 1/92 | 8/2/92 | 2/1/93 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I. | PCBs (µg/L) | | | | | | | | | | | | |
| | Aroclor 1242 | ND 0.5 | ND 1.0 | NA | ND 0.5 | ND 0.47 | ND 0.52 | NA | ND 0.24 | ND 0.5 | NA | NA | NA |
| | Aroclor 1254 | ND 0.5 | ND 1.0 | ND .5 | ND 0.5 | ND 0.47 | ND 0.52 | NA | ND 0.49 | ND 0.5 | 3.8 | ND 0.5 | 1.3 |
| | Aroclor 1260 | 2.6 | 3.6/3.1(c) | 1.4 | 1.0 | 2.7 | 2.3 | NA | 4.3 | 3.8 | 3.5 | 3.7 | 2.3 |
| | Total PCBs | NA | NA | NA | | | | 1.4 | NA | NA | NA | NA | NA |
| II. | VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | | | | | | |
| | Benzene | ND 5.0 | ND 0.5 | ND 0.5 | ND 0.5 | ND 5 | NA | NA | NA | NA | NA | NA | NA |
| | Tetrachloroethene | ND 5.0 | 0.57 | 0.55 | ND 0.2 | ND 5 | NA | NA | NA | NA | NA | NA | NA |
| | Trichloroethane | ND 5.0 | 0.20 | 0.27 | ND 0.2(1) | ND 5(1) | NA | NA | NA | NA | NA | NA | NA |
| | Xylenes | NA | NA | NA | ND 0.5(2) | ND 5(2) | NA | NA | NA | NA | NA | NA | NA |
| | Trichloroethene | ND 5.0 | NA | NA | ND 0.2 | ND 5 | NA | NA | NA | NA | NA | NA | NA |
| III. | CHLORINATED BENZENES (µg/L) | | | | | | | | | | | | |
| | 1,2,3,5-Tetrachlorobenzene | NA | NA | NA | NA | 2.6j | 0.13 | NA | 0.05j | 0.045 | NA | NA | NA |
| IV. | TOTAL PETROLEUM HYDROCARBONS (µg/L) | NA | 0.29 | 0.23 | NA | ND 1000(3) | NA | NA | NA | NA | NA | NA | NA |
| V. | OTHER ORGANICS (µg/L) | | | | | | | | | | | | |
| | Butylbenzylphthalate | NA | NA | NA | NA | ND 10 | NA | NA | NA | NA | NA | NA | NA |
| | Diethylphthalate | NA | NA | NA | NA | ND 10 | NA | NA | NA | NA | NA | NA | NA |
| | Total Organic Carbon | NA | NA | NA | NA | 12100(4) | NA | NA | NA | NA | NA | NA | NA |
| | Oil and Grease | NA | NA | NA | ND 1.0 | NA | NA | NA | NA | NA | NA | NA | NA |
| VI. | METALS (mg/L) | | | | | | | | | | | | |
| | Lead | | | | | | | | | | | | |
| | 5.0 mm | NA | ND .002 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | ND .002 | ND 0.002 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Zinc | | | | | | | | | | | | |
| | 5.0 mm | NA | 0.06 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | 0.04 | 0.06 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| VII. | INORGANIC WATER QUALITY | | | | | | | | | | | | |
| | pH | NA | NA | NA | 7.54 | NA | NA | NA | NA | NA | NA | NA | NA |
| | Conductivity (umhos/cm) | NA | NA | NA | 317 | NA | NA | NA | NA | NA | NA | NA | NA |
| | TDS (mg/L) | NA | NA | NA | 173 | NA | NA | NA | NA | NA | NA | NA | NA |
| | TSS (mg/L) | NA | NA | NA | ND 1.0 | NA | NA | NA | NA | NA | NA | NA | NA |
| | Chloride (mg/L) | NA | NA | NA | 1.86 | NA | NA | NA | NA | NA | NA | NA | NA |
| | Nitrate (mg/L) | NA | NA | NA | 1.433 | NA | NA | NA | NA | NA | NA | NA | NA |
| | Sulfate (mg/L) | NA | NA | NA | 14.9 | NA | NA | NA | NA | NA | NA | NA | NA |
| | Silica (mg/L $SiO_2$) | NA | NA | NA | 13.31 | NA | NA | NA | NA | NA | NA | NA | NA |
| | Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | 126.7 | NA | NA | NA | NA | NA | NA | NA | NA |

Notes:
ND = Not Detected
NA = Not Analyzed
j = Estimated concentration below sample quantification limit.
(c) = Centrifuged sample result
(1) Neither 1,1,1- nor 1,1,2 - were detected
(2) Total Xylenes
(3) Reported as <1 mg/L "petroleum hydrocarbons"
(4) Reported as 12.1 mg/L.

TABLE A-6

CHEMICALS IN GROUND WATER - WELL MW6

| | 1/25/88 | 7/8/90 | 10/14/90 | 1/12/91 | 3/27/91 | 8/2/91 | 1/92 | 7/28/92 | 1/27/93 |
|---|---|---|---|---|---|---|---|---|---|
| I. PCBs (µg/L) | | | | | | | | | |
| Aroclor 1242 | ND 0.1 | ND 0.5 | ND 0.47 | ND 0.52 | ND 0.25 | ND 0.5 | NA | NA | NA |
| Aroclor 1254 | ND 0.5 | ND 0.5 | ND 0.47 | ND 0.52 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| Aroclor 1260 | ND 0.5+ | ND 0.5 | ND 0.47 | ND 0.52 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| Total PCBs | NA | ND | ND | ND | NA | NA | NA | NA | NA |
| II. VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | | | |
| Benzene | ND 0.5 | ND 0.5 | ND 5 | NA | NA | ND 0.002 | NA | NA | NA |
| Tetrachloroethene | 0.51 | ND 0.2 | ND 5 | NA | NA | NA | NA | NA | NA |
| Trichloroethane | 0.3 | ND 0.2(1) | ND 5(1) | NA | NA | NA | NA | NA | NA |
| Xylenes | NA | ND 0.5(2) | ND 5(2) | NA | NA | NA | NA | NA | NA |
| Trichloroethene | ND 0.2 | ND 0.2 | ND 1000(3) | NA | NA | NA | NA | NA | NA |
| III. CHLORINATED BENZENES (µg/L) | | | | | | | | | |
| 1,2,3,5-Tetrachlorobenzene | NA | NA | ND | NA | NA | NA | NA | NA | NA |
| IV. TOTAL PETROLEUM HYDROCARBONS (µg/L) | 0.94 | NA | NA | NA | NA | NA | NA | NA | NA |
| V. OTHER ORGANICS (µg/L) | | | | | | | | | |
| Butylbenzylphthalate | ND 10 | NA | ND | NA | NA | NA | NA | NA | NA |
| Diethylphthalate | ND 10 | NA | ND | NA | NA | NA | NA | NA | NA |
| Total Organic Carbon | NA | NA | 2400(4) | NA | NA | NA | NA | NA | NA |
| Oil and Grease | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| VI. METALS (mg/L) | | | | | | | | | |
| Lead | | | | | | | | | |
| 5.0 mm | ND .002 | NA | NA | NA | NA | NA | NA | NA | NA |
| 0.45 mm | ND .002 | NA | NA | NA | NA | NA | NA | NA | NA |
| Zinc | | | | | | | | | |
| 5.0 mm | 0.11 | NA | NA | NA | NA | NA | NA | NA | NA |
| 0.45 mm | 0.10 | NA | NA | NA | NA | NA | NA | NA | NA |
| VII. INORGANIC WATER QUALITY | | | | | | | | | |
| pH | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = Not Detected
NA = Not Analyzed
\+ = Suspected PCB congeners present
(1) Neither 1,1,1- nor 1,1,2 - were detected
(2) Total Xylenes
(3) Reported as <1 mg/L "Petroleum Hydrocarbons"
(4) Reported as 2.4 mg/L.

TABLE A-7

CHEMICALS IN GROUND WATER - WELL MW7

| | 1/19/88 | 10/13/90 | 1/13/91 | 3/27/91 | 8/5/91 | 1/92 | 7/30/92 | 1/30/93 |
|---|---|---|---|---|---|---|---|---|
| I. PCBs (µg/L) | | | | | | | | |
| Aroclor 1242 | NA | ND 0.47 | ND 0.52 | ND 0.25 | ND 0.5 | NA | NA | NA |
| Aroclor 1254 | NA | ND 0.47 | ND 0.52 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| Aroclor 1260 | ND 0.1 | ND 0.47 | ND 0.52 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| Total PCBs | NA | ND | ND | NA | NA | NA | NA | NA |
| II. VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | | |
| Benzene | ND 0.5 | ND 5 | NA | NA | NA | NA | NA | NA |
| Tetrachloroethene | 0.72 | ND 5 | NA | NA | NA | NA | NA | NA |
| Trichloroethane | ND 0.2 | ND 5(1) | NA | NA | NA | NA | NA | NA |
| Xylenes | NA | ND 5(2) | NA | NA | NA | NA | NA | NA |
| Trichloroethene | NA | ND 5 | NA | NA | NA | NA | NA | NA |
| III. CHLORINATED BENZENES (µg/L) | | | | | | | | |
| 1,2,3,5-Tetrachlorobenzene | NA | ND 10 | NA | NA | ND 0.002 | NA | NA | NA |
| IV. TOTAL PETROLEUM HYDROCARBONS (µg/L) | 17 | ND 1000(3) | NA | NA | NA | NA | NA | NA |
| V. OTHER ORGANICS (µg/L) | | | | | | | | |
| Butylbenzylphthalate | NA | ND 10 | NA | NA | NA | NA | NA | NA |
| Diethylphthalate | NA | 1j | NA | NA | NA | NA | NA | NA |
| Total Organic Carbon | NA | 1100(4) | NA | NA | NA | NA | NA | NA |
| Oil and Grease | NA | NA | NA | NA | NA | NA | NA | NA |
| VI. METALS (mg/L) | | | | | | | | |
| Lead | | | | | | | | |
| 5.0 mm | ND .002 | NA | NA | NA | NA | NA | NA | NA |
| 0.45 mm | 0.003 | NA | NA | NA | NA | NA | NA | NA |
| Zinc | | | | | | | | |
| 5.0 mm | 0.03 | NA | NA | NA | NA | NA | NA | NA |
| 0.45 mm | 0.05 | NA | NA | NA | NA | NA | NA | NA |
| VII. INORGANIC WATER QUALITY | | | | | | | | |
| pH | NA | NA | NA | NA | NA | NA | NA | NA |
| Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA | NA |
| TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA | NA |
| Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = Not Detected
NA = Not Analyzed
j = Estimated concentration below sample qualification limit
(1) Neither 1,1,1- nor 1,1,2 - were detected
(2) Total Xylenes
(3) Reported as <1 mg/L "Petroleum Hydrocarbons"
(4) Reported as 1.1 mg/L.

TABLE A-8

CHEMICALS IN GROUND WATER - WELL MW8

| | 1/25/88 | 1/25/88D | 7/10/90 | 10/14/90 | 1/12/91 | 1/12/91D | 3/27/91 | 8/1/91 | 1/92 | 7/28/92 | 1/27/93 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| I. PCBs (ug/L) | | | | | | | | | | | |
| Aroclor 1242 | NA | NA | ND 0.5 | ND 10 | ND 0.52 | NA | ND 0.25 | ND 0.5 | ND 0.5 | NA | NA |
| Aroclor 1254 | NA | ND .5 | ND 0.5 | ND 10 | ND 0.52 | NA | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| Aroclor 1260 | 1.1/0.09(c) | 0.91 | ND 0.5 | 150 | 6.1 | NA | 4.8 | 3.5 | 3.5 | 2.8 | 2.9 |
| Total PCBs | NA | NA | NA | | | 7.7 | NA | NA | | NA | NA |
| II. VOLATILE ORGANIC COMPOUNDS (ug/L) | | | | | | | | | | | |
| Benzene | ND 0.5 | ND 0.5 | ND 0.5 | ND 5 | NA | NA | NA | NA | NA | NA | NA |
| Tetrachloroethene | 0.51 | 0.33 | ND 0.2 | ND 5 | NA | NA | NA | NA | NA | NA | NA |
| Trichloroethane | 0.3 | 0.31 | ND 0.2 | ND 0.5(1) | NA | NA | NA | NA | NA | NA | NA |
| Xylenes | NA | NA | 1.3 | ND 0.5(2) | NA | NA | NA | NA | NA | NA | NA |
| Trichloroethene | ND 0.2 | ND 0.2 | ND 0.2 | ND 0.5 | NA | NA | | | | | |
| III. CHLORINATED BENZENES (ug/L) | | | | | | | | | | | |
| 1,2,3,5-Tetrachlorobenzene | NA | NA | ND | ND 10 | 0.006 | NA | ND 0.08 | ND 0.002 | NA | NA | NA |
| IV. TOTAL PETROLEUM HYDROCARBONS (ug/L) | 0.29 | 0.07 | ND 1000(3) | NA | NA | NA | NA | NA | NA | NA | NA |
| V. OTHER ORGANICS (ug/L) | | | | | | | | | | | |
| Butylbenzylphthalate | NA | NA | NA | 2.0j | NA | NA | NA | NA | NA | NA | NA |
| Diethylphthalate | NA | NA | NA | ND 10 | NA | NA | NA | NA | NA | NA | NA |
| Total Organic Carbon | NA | NA | ND 9000(4) | NA | | NA | NA | NA | NA | NA | NA |
| Oil and Grease | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| VI. METALS (mg/L) | | | | | | | | | | | |
| Lead | | | | | | | | | | | |
| 5.0 mm | ND 0.002 | ND .002 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 0.45 mm | ND 0.002 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Zinc | | | | | | | | | | | |
| 5.0 mm | 0.12 | 0.10 | NA | NA | NA | | | | | | |
| 0.45 mm | 0.11 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| VII. INORGANIC WATER QUALITY | | | | | | | | | | | |
| pH | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = Not Detected
NA = Not Analyzed
j = Estimated concentration below sample qualification limit
(c) = Centrifuged sample result
(1) Neither 1,1,1- nor 1,1,2 - were detected
(2) Total Xylenes
(3) Reported as <1 mg/L "Petroleum Hydrocarbons"
(4) Reported as 9 mg/L.

TABLE A-9U

CHEMICALS IN GROUND WATER - WELL MW9U

| | | 1/29/88 | 10/16/90 | 1/15/91 | 3/29/91 | 8/5/91 | 1/92 | 7/31/92 | 1/28/93 |
|---|---|---|---|---|---|---|---|---|---|
| I. | PCBs (µg/L) | | | | | | | | |
| | Aroclor 1242 | NA | ND 0.47 | ND 0.52 | ND 0.24 | ND 0.5 | NA | NA | NA |
| | Aroclor 1254 | NA | ND 0.47 | ND 0.52 | ND 0.48 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Aroclor 1260 | ND 0.5+/ND 0.1+(1) | ND 0.47 | ND 0.52 | ND 0.48 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Total PCBs | NA | ND | ND 0.52 | NA | NA | NA | NA | NA |
| II. | VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | | |
| | Benzene | 5.6 | ND 5 | NA | NA | NA | NA | NA | NA |
| | Tetrachloroethene | ND 0.2 | ND 5 | NA | NA | NA | NA | NA | NA |
| | Trichloroethane | ND 0.2 | ND 5(2) | NA | NA | NA | NA | NA | NA |
| | Xylenes | NA | ND 5(3) | NA | NA | NA | NA | NA | NA |
| | Trichloroethene | NA | ND 5 | NA | NA | NA | NA | NA | NA |
| III. | CHLORINATED BENZENES (µg/L) | | | | | | | | |
| | 1,2,3,5-Tetrachlorobenzene | NA | NA | NA | NA | ND 0.002 | NA | NA | NA |
| IV. | TOTAL PETROLEUM HYDROCARBONS (µg/L) | 0.13 | ND 1000(4) | NA | NA | NA | NA | NA | NA |
| V. | OTHER ORGANICS (µg/L) | | | | | | | | |
| | Butylbenzylphthalate | NA | NA | ND 10 | NA | NA | NA | NA | NA |
| | Diethylphthalate | NA | NA | ND 10 | NA | NA | NA | NA | NA |
| | Total Organic Carbon | NA | 1600(5) | NA | NA | NA | NA | NA | NA |
| | Oil and Grease | NA | NA | NA | NA | NA | NA | NA | NA |
| VI. | METALS (mg/L) | | | | | | | | |
| | Lead | | | | | | | | |
| | 5.0 mm | ND 0.002 | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | ND 0.002 | NA | NA | NA | NA | NA | NA | NA |
| | Zinc | | | | | | | | |
| | 5.0 mm | ND 0.01 | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | ND 0.01 | NA | NA | NA | NA | NA | NA | NA |
| VII. | INORGANIC WATER QUALITY | | | | | | | | |
| | pH | NA | NA | NA | NA | NA | NA | NA | NA |
| | Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA | NA |
| | TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA | NA\ |

Note:
ND = Not Detected
NA = Not Analyzed
\+ = Suspected PCB congeners present
(1) ND 0.1+ is for Sample Centrifuged
ND 0.5+ is for Sample Uncentrifuged
(2) Neither 1,1,1- nor 1,1,2 - were detected
(3) Total Xylenes
(4) Reported as <1 mg/L "Petroleum Hydrocarbons"
(5) Reported as 1.6 mg/L.

TABLE A-9L

CHEMICALS IN GROUND WATER - WELL MW9L

| | | 1/28/88 | 10/16/90 | 1/15/91 | 3/29/91 | 8/5/91 | 1/92 | 7/31/92 | 1/28/93 |
|---|---|---|---|---|---|---|---|---|---|
| I. | PCBs (µg/L) | | | | | | | | |
| | Aroclor 1242 | NA | NA | ND 0.52 | ND 0.26 | ND 0.5 | NA | NA | NA |
| | Aroclor 1254 | NA | NA | ND 0.52 | ND 0.52 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Aroclor 1260 | ND 0.1+ | NA | ND 0.52 | ND 0.52 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Total PCBs | NA | ND | ND | NA | NA | NA | NA | NA |
| II. | VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | | |
| | Benzene | 0.74 | NA | NA | NA | NA | NA | NA | NA |
| | Tetrachloroethene | ND 0.2 | NA | NA | NA | NA | NA | NA | NA |
| | Trichloroethane | ND 0.2 | NA | NA | NA | NA | NA | NA | NA |
| | Xylenes | NA | NA | NA | NA | NA | NA | NA | NA |
| | Trichloroethene | NA | NA | NA | NA | NA | NA | NA | NA |
| III. | CHLORINATED BENZENES (µg/L) | | | | | | | | |
| | 1,2,3,5-Tetrachlorobenzene | NA | ND | NA | NA | ND 0.002 | NA | NA | NA |
| IV. | TOTAL PETROLEUM HYDROCARBONS (µg/L) | 0.3 | ND 1000(1) | NA | NA | NA | NA | NA | NA |
| V. | OTHER ORGANICS (µg/L) | | | | | | | | |
| | Butylbenzylphthalate | NA | ND | ND 10 | NA | NA | NA | NA | NA |
| | Diethylphthalate | NA | ND | ND 10 | NA | NA | NA | NA | NA |
| | Total Organic Carbon | NA | 700(2) | NA | NA | NA | NA | NA | NA |
| | Oil and Grease | NA | NA | NA | NA | NA | NA | NA | NA |
| VI. | METALS (mg/L) | | | | | | | | |
| | Lead | | | | | | | | |
| | 5.0 mm | ND 0.002 | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | ND 0.002 | NA | NA | NA | NA | NA | NA | NA |
| | Zinc | | | | | | | | |
| | 5.0 mm | 0.04 | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | 0.04 | NA | NA | NA | NA | NA | NA | NA |
| VII. | INORGANIC WATER QUALITY | | | | | | | | |
| | pH | NA | NA | NA | NA | NA | NA | NA | NA |
| | Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA | NA |
| | TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = Not Detected
NA = Not Analyzed
\+ = Suspected PCB congeners present (Uncentrifuged and Centrifuged)
(1) Reported as <1 mg/L "Petroleum Hydrocarbons"
(2) Reported as 0.7 mg/L.

TABLE A-10

CHEMICALS IN GROUND WATER - WELL MW10

| | 1/22/88 | 10/15/90 | 1/14/91 | 3/29/91 | 8/2/91 | 1/92 | 7/31/92 | 1/28/93 |
|---|---|---|---|---|---|---|---|---|
| I. PCBs (µg/L) | | | | | | | | |
| Aroclor 1242 | ND 0.1 | NA | ND 0.52 | ND 0.24 | ND 0.5 | NA | NA | ND |
| Aroclor 1254 | ND 0.1 | NA | ND 0.52 | ND 0.49 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| Aroclor 1260 | ND 0.1+ | NA | ND 0.52 | ND 0.49 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| Total PCBs | NA | ND | ND | NA | NA | NA | NA | NA |
| II. VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | | |
| Benzene | ND 0.5 | NA | NA | NA | NA | NA | NA | NA |
| Tetrachloroethene | 0.73 | NA | NA | NA | NA | NA | NA | NA |
| Trichloroethane | 0.28 | NA | NA | NA | NA | NA | NA | NA |
| Xylenes | NA | NA | NA | NA | NA | NA | NA | NA |
| Trichloroethene | ND 0.02 | NA | NA | NA | NA | NA | NA | NA |
| III. CHLORINATED BENZENES (µg/L) | | | | | | | | |
| 1,2,3,5-Tetrachlorobenzene | NA | ND | ND 0.005 | NA | ND 0.002 | NA | NA | NA |
| IV. TOTAL PETROLEUM HYDROCARBONS (µg/L) | 0.45 | ND 1000(1) | NA | NA | NA | NA | NA | NA |
| V. OTHER ORGANICS (µg/L) | | | | | | | | |
| Butylbenzylphthalate | NA | ND | NA | NA | NA | NA | NA | NA |
| Diethylphthalate | NA | ND | NA | NA | NA | NA | NA | NA |
| Total Organic Carbon | NA | 7100(2) | NA | NA | NA | NA | NA | NA |
| Oil and Grease | NA | NA | NA | NA | NA | NA | NA | NA |
| VI. METALS (mg/L) | | | | | | | | |
| Lead | | | | | | | | |
| 5.0 mm | ND 0.002 | NA | NA | NA | NA | NA | NA | NA |
| 0.45 mm | ND 0.002 | NA | NA | NA | NA | NA | NA | NA |
| Zinc | | | | | | | | |
| 5.0 mm | 0.20 | NA | NA | NA | NA | NA | NA | NA |
| 0.45 mm | 0.08 | NA | NA | NA | NA | NA | NA | NA |
| VII. INORGANIC WATER QUALITY | | | | | | | | |
| pH | NA | NA | NA | NA | NA | NA | NA | NA |
| Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA | NA |
| TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA | NA |
| Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = Not Detected
NA = Not Analyzed
\+ = Suspected PCB congeners present (Uncentrifuged and Centrifuged)
(1) Reported as <1 mg/L "Petroleum Hydrocarbons"
(2) Reported as 7.1 mg/L.

TABLE A-11

CHEMICALS IN GROUND WATER - WELL MW11

| | 1/27/88 | 7/7/90 | 10/15/90 | 10/15/90D | 1/13/91 | 4/1/91 | 8/2/91 | 1/92 | 7/31/92 | 1/28/93 |
|---|---|---|---|---|---|---|---|---|---|---|
| I. PCBs (ug/L) | | | | | | | | | | |
| Aroclor 1242 | NA | ND 0.05 | ND 0.47 | ND 0.5 | ND 0.52 | ND 0.24 | ND 0.5 | NA | NA | NA |
| Aroclor 1254 | NA | ND 0.05 | ND 0.47 | ND 0.5 | ND 0.52 | ND 0.49 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| Aroclor 1260 | 0.71 | 0.34[J] | ND 0.47 | ND 0.5 | ND 0.52 | 0.89 | 0.52 | ND 0.5 | 0.38[J] | ND 0.5 |
| Total PCBs | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| II. VOLATILE ORGANIC COMPOUNDS (ug/L) | | | | | | | | | | |
| Benzene | 0.71 | ND 0.05 | ND 5 | ND 5 | NA | NA | NA | NA | NA | NA |
| Tetrachloroethene | 0.52 | ND 0.02 | ND 5 | ND 5 | NA | NA | NA | NA | NA | NA |
| Trichloroethane | 0.23 | ND 0.02[1] | ND 5[1] | ND 5[1] | NA | NA | NA | NA | NA | NA |
| Xylenes | NA | 1.2[2] | ND 5[2] | ND 5[2] | NA | NA | NA | NA | NA | NA |
| Trichloroethene | NA | ND 0.02 | ND 5 | ND 5 | NA | NA | NA | NA | NA | NA |
| III. CHLORINATED BENZENES (ug/L) | | | | | | | | | | |
| 1,2,3,5-Tetrachlorobenzene | NA | NA | ND 10 | ND 10 | 0.016 | NA | 0.0069 | NA | NA | NA |
| IV. TOTAL PETROLEUM HYDROCARBONS (ug/L) | 0.23 | NA | ND 1000[3] | NA | NA | NA | NA | NA | NA | NA |
| V. OTHER ORGANICS (ug/L) | | | | | | | | | | |
| Butylbenzylphthalate | NA | NA | ND | ND 10 | NA | NA | NA | NA | NA | NA |
| Diethylphthalate | NA | NA | ND | ND 10 | NA | NA | NA | NA | NA | NA |
| Total Organic Carbon | NA | NA | 8000/1000[4] | NA | NA | NA | NA | NA | NA | NA |
| Oil and Grease | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| VI. METALS (mg/L) | | | | | | | | | | |
| Lead | | | | | | | | | | |
| 5.0 mm | ND 0.002 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 0.45 mm | ND 0.002 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Zinc | | | | | | | | | | |
| 5.0 mm | 0.11 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 0.45 mm | 0.05 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| VII. INORGANIC WATER QUALITY | | | | | | | | | | |
| pH | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| TDS (mg/L) | NA | 171 | NA | NA | NA | NA | NA | NA | NA | NA |
| TSS (mg/L) | NA | ND 1.0 | NA | NA | NA | NA | NA | NA | NA | NA |
| Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Nitrate (mg/L) | NA | 1.329 | NA | NA | NA | NA | NA | NA | NA | NA |
| Sulfate (mg/L) | NA | 14.9 | NA | NA | NA | NA | NA | NA | NA | NA |
| Silica (mg/L $SiO_2$) | NA | 13.21 | NA | NA | NA | NA | NA | NA | NA | NA |
| Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

Note:

ND = Not Detected    * = Duplicate
NA = Not Analyzed
(1) Neither 1,1,1- nor 1,1,2 - were detected
(2) Total Xylenes
(J) Estimated value
(3) Reported as ≤1 mg/L "Petroleum Hydrocarbons"
(4) Reported as 8.0/1.8+ mg/L.

TABLE A-12

CHEMICALS IN GROUND WATER - WELL MW12

| | | 10/17/90 | 1/16/91 | 4/1/91 | 7/31/91 | 1/92 | 7/29/92 | 2/1/93 |
|---|---|---|---|---|---|---|---|---|
| I. | PCBs (µg/L) | | | | | | | |
| | Aroclor 1242 | ND 0.47 | ND 0.52 | ND 0.24 | ND 0.5 | NA | NA | NA |
| | Aroclor 1254 | ND 0.47 | ND 0.52 | ND 0.48 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Aroclor 1260 | ND 0.47 | ND 0.52 | ND 0.48 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Total PCBs | ND | ND | NA | NA | NA | NA | NA |
| II. | VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | |
| | Benzene | ND 5 | NA | NA | NA | NA | NA | NA |
| | Tetrachloroethene | ND 5 | NA | NA | NA | NA | NA | NA |
| | Trichloroethane | ND 5(1) | NA | NA | NA | NA | NA | NA |
| | Xylenes | ND 5(2) | NA | NA | NA | NA | NA | NA |
| | Trichloroethene | ND 5 | NA | NA | NA | NA | NA | NA |
| III. | CHLORINATED BENZENES (µg/L) | | | | | | | |
| | 1,2,3,5-Tetrachlorobenzene | ND 10 | NA | NA | ND 0.002 | NA | NA | NA |
| IV. | TOTAL PETROLEUM HYDROCARBONS (µg/L) | ND 1000(3) | NA | NA | NA | NA | NA | NA |
| V. | OTHER ORGANICS (µg/L) | | | | | | | |
| | Butylbenzylphthalate | ND 10 | NA | NA | NA | NA | NA | NA |
| | Diethylphthalate | ND 10 | NA | NA | NA | NA | NA | NA |
| | Total Organic Carbon | 1200(4) | NA | NA | NA | NA | NA | NAw |
| | Oil and Grease | NA | NA | NA | NA | NA | NA | NA |
| VI. | METALS (mg/L) | | | | | | | |
| | Lead | | | | | | | |
| | 5.0 mm | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | NA | NA | NA | NA | NA | NA |
| | Zinc | | | | | | | |
| | 5.0 mm | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | NA | NA | NA | NA | NA | NA |
| VII. | INORGANIC WATER QUALITY | | | | | | | |
| | pH | NA | NA | NA | NA | NA | NA | NA |
| | Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA |
| | TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA |
| | Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = Not Detected
NA = Not Analyzed
(1) Neither 1,1,1- nor 1,1,2 - were detected
(2) Total Xylenes
(3) Reported as ≤1 mg/L "Petroleum Hydrocarbons"
(4) Reported as 1.2 mg/L.

TABLE A-13

CHEMICALS IN GROUND WATER - WELL MW13

| | | 10/12/90 | 1/17/91 | 3/30/91 | 7/31/91 | 1/92 | 8/1/92 | 2/1/93 |
|---|---|---|---|---|---|---|---|---|
| I. | PCBs (µg/L) | | | | | | | |
| | Aroclor 1242 | ND 0.47 | ND 0.52 | ND 0.24 | ND 0.5 | NA | NA | NA |
| | Aroclor 1254 | ND 0.47 | ND 0.52 | ND 0.49 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Aroclor 1260 | ND 0.47 | ND 0.52 | ND 0.49 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Total PCBs | ND | ND | NA | NA | NA | NA | NA |
| II. | VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | |
| | Benzene | ND 5 | NA | NA | NA | NA | NA | NA |
| | Tetrachloroethene | ND 5 | NA | NA | NA | NA | NA | NA |
| | Trichloroethane | ND 5(1) | NA | NA | NA | NA | NA | NA |
| | Xylenes | ND 5(2) | NA | NA | NA | NA | NA | NA |
| | Trichloroethene | ND 5 | NA | NA | NA | NA | NA | NA |
| III. | CHLORINATED BENZENES (µg/L) | | | | | | | |
| | 1,2,3,5-Tetrachlorobenzene | ND 10 | NA | NA | ND 0.002 | NA | NA | NA |
| IV. | TOTAL PETROLEUM HYDROCARBONS (µg/L) | ND 1000(3) | NA | NA | NA | NA | NA | NA |
| V. | OTHER ORGANICS (µg/L) | | | | | | | |
| | Butylbenzylphthalate | ND 10 | NA | NA | NA | NA | NA | NA |
| | Diethylphthalate | ND 10 | NA | NA | NA | NA | NA | NA |
| | Total Organic Carbon | ND 500(4) | NA | NA | NA | NA | NA | NA |
| | Oil and Grease | NA | NA | NA | NA | NA | NA | NA |
| VI. | METALS (mg/L) | | | | | | | |
| | Lead | | | | | | | |
| | 5.0 mm | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | NA | NA | NA | NA | NA | NA |
| | Zinc | | | | | | | |
| | 5.0 mm | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | NA | NA | NA | NA | NA | NA |
| VII. | INORGANIC WATER QUALITY | | | | | | | |
| | pH | NA | NA | NA | NA | NA | NA | NA |
| | Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA |
| | TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA |
| | Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = Not Detected
NA = Not Analyzed
(1) Neither 1,1,1- nor 1,1,2 - were detected
(2) Total Xylenes
(3) Reported as ≤1 mg/L "Petroleum Hydrocarbons"
(4) Reported as <0.5 mg/L.

TABLE A-14

CHEMICALS IN GROUND WATER - WELL MW14

| | | 10/12/90 | 1/16/91 | 3/30/91 | 8/1/91 | 1/92 | 8/2/92 | 1/29/93 |
|---|---|---|---|---|---|---|---|---|
| I. | PCBs (µg/L) | | | | | | | |
| | Aroclor 1242 | ND 0.47 | ND 0.52 | ND 0.25 | ND 0.5 | NA | NA | NA |
| | Aroclor 1254 | ND 0.47 | ND 0.52 | ND 0.49 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Aroclor 1260 | ND 0.47 | ND 0.52 | ND 0.49 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Total PCBs | ND | ND | NA | NA | NA | NA | NA |
| II. | VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | |
| | Benzene | ND 5 | NA | NA | NA | NA | NA | NA |
| | Tetrachloroethene | ND 5 | NA | NA | NA | NA | NA | NA |
| | Trichloroethane | ND 5(1) | NA | NA | NA | NA | NA | NA |
| | Xylenes | ND 5(2) | NA | NA | NA | NA | NA | NA |
| | Trichloroethene | ND 5 | NA | NA | NA | NA | NA | NA |
| III. | CHLORINATED BENZENES (µg/L) | | | | | | | |
| | 1,2,3,5-Tetrachlorobenzene | ND 10 | NA | NA | ND 0.002 | NA | NA | NA |
| IV. | TOTAL PETROLEUM HYDROCARBONS (µg/L) | ND 1000(3) | NA | NA | NA | NA | NA | NA |
| V. | OTHER ORGANICS (µg/L) | | | | | | | |
| | Butylbenzylphthalate | ND 10 | NA | NA | NA | NA | NA | NA |
| | Diethylphthalate | ND 10 | NA | NA | NA | NA | NA | NA |
| | Total Organic Carbon | 800(4) | NA | NA | NA | NA | NA | NA |
| | Oil and Grease | NA | NA | NA | NA | NA | NA | NA |
| VI. | METALS (mg/L) | | | | | | | |
| | Lead | | | | | | | |
| | 5.0 mm | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | NA | NA | NA | NA | NA | NA |
| | Zinc | | | | | | | |
| | 5.0 mm | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | NA | NA | NA | NA | NA | NA |
| VII. | INORGANIC WATER QUALITY | | | | | | | |
| | pH | NA | NA | NA | NA | NA | NA | NA |
| | Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA |
| | TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA |
| | Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = Not Detected
NA = Not Analyzed
(1) Neither 1,1,1 - nor 1,1,2 - were detected
(2) Totaly Xylenes
(3) Reported as <1 mg/L "Petroleum Hydrocarbons"
(4) Reported as 0.8 mg/L.

TABLE A-15

CHEMICALS IN GROUND WATER - WELL MW15

| | | 10/16/90 | 10/16/90D | 1/17/91 | 3/30/91 | 7/31/91 | 1/92 | 8/1/92 | 2/1/93 |
|---|---|---|---|---|---|---|---|---|---|
| I. | PCBs (µg/L) | | | | | | | | |
| | Aroclor 1242 | ND 0.47 | ND 0.47 | ND 0.53 | ND 0.24 | ND 0.5 | NA | NA | NA |
| | Aroclor 1254 | ND 0.47 | ND 0.47 | ND 0.53 | ND 0.49 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Aroclor 1260 | ND 0.47 | ND 0.47 | ND 0.53 | ND 0.49 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Total PCBs | ND | ND | ND | NA | NA | NA | NA | NA |
| II. | VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | | |
| | Benzene | ND 5 | ND 5 | NA | NA | NA | NA | NA | NA |
| | Tetrachloroethene | ND 5 | ND 5 | NA | NA | NA | NA | NA | NA |
| | Trichloroethane | ND 5(1) | ND 5(1) | NA | NA | NA | NA | NA | NA |
| | Xylenes | ND 5(2) | ND 5(2) | NA | NA | NA | NA | NA | NA |
| | Trichloroethene | ND 5 | ND | NA | NA | NA | NA | NA | NA |
| III. | CHLORINATED BENZENES (µg/L) | | | | | | | | |
| | 1,2,3,5-Tetrachlorobenzene | NA | NA | ND 0.005 | NA | ND 0.002 | NA | NA | NA |
| IV. | TOTAL PETROLEUM HYDROCARBONS (µg/L) | NA | ND 1000(3) | NA | NA | NA | NA | NA | NA |
| V. | OTHER ORGANICS (µg/L) | | | | | | | | |
| | Butylbenzylphthalate | ND 10 | ND 3400 (6) | ND 10 | NA | NA | NA | NA | NA |
| | Diethylphthalate | ND 10 | ND 3400 (6) | ND 10 | NA | NA | NA | NA | NA |
| | Total Organic Carbon | ND 500 (5) | 3400(4) | NA | NA | NA | NA | NA | NA |
| | Oil and Grease | NA | NA | NA | NA | NA | NA | NA | NA |
| VI. | METALS (mg/L) | | | | | | | | |
| | Lead | | | | | | | | |
| | 5.0 mm | NA | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | NA | NA | NA | NA | NA | NA | NA |
| | Zinc | | | | | | | | |
| | 5.0 mm | NA | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | NA | NA | NA | NA | NA | NA | NA |
| VII. | INORGANIC WATER QUALITY | | | | | | | | |
| | pH | NA | NA | NA | NA | NA | NA | NA | NA |
| | Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA | NA |
| | TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA | NA |
| | Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = Not Detected
NA = Not Analyzed
(1) Neither 1,1,1 - nor 1,1,2 - were detected
(2) Totaly Xylenes
(3) Reported as <1 mg/L "Petroleum Hydrocarbons"
(4) Reported as 3.4 mg/L.
(5) Reported as 0.5 mg/L.
(6) High reported detection limit due to dilution factor of 340.0

TABLE A-16

CHEMICALS IN GROUND WATER - WELL MW16

| | | 10/12/90 | 1/17/91 | 3/31/91 | 8/1/91 | 1/92 | 8/1/92 | 1/30/93 |
|---|---|---|---|---|---|---|---|---|
| I. | PCBs (µg/L) | | | | | | | |
| | Aroclor 1242 | ND 0.47 | ND 0.52 | ND 0.24 | ND 0.5 | NA | NA | NA |
| | Aroclor 1254 | ND 0.47 | ND 0.52 | ND 0.49 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Aroclor 1260 | ND 0.47 | ND 0.52 | ND 0.49 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Total PCBs | ND | ND | NA | NA | NA | NA | NA |
| II. | VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | |
| | Benzene | ND 5 | NA | NA | NA | NA | NA | NA |
| | Tetrachloroethene | ND 5 | NA | NA | NA | NA | NA | NA |
| | Trichloroethane | ND 5[1] | NA | NA | NA | NA | NA | NA |
| | Xylenes | ND 5[2] | NA | NA | NA | NA | NA | NA |
| | Trichloroethene | ND 5 | NA | NA | NA | NA | NA | NA |
| III. | CHLORINATED BENZENES (µg/L) | | | | | | | |
| | 1,2,3,5-Tetrachlorobenzene | ND | NA | NA | ND 0.002 | NA | NA | NA |
| IV. | TOTAL PETROLEUM HYDROCARBONS (µg/L) | ND 1000[3] | NA | NA | NA | NA | NA | NA |
| V. | OTHER ORGANICS (µg/L) | | | | | | | |
| | Butylbenzylphthalate | ND 10 | NA | NA | NA | NA | NA | NA |
| | Diethylphthalate | ND 10 | NA | NA | NA | NA | NA | NA |
| | Total Organic Carbon | 700[4] | NA | NA | NA | NA | NA | NA |
| | Oil and Grease | NA | NA | NA | NA | NA | NA | NA |
| VI. | METALS (mg/L) | | | | | | | |
| | Lead | | | | | | | |
| | 5.0 mm | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | NA | NA | | | | |
| | Zinc | | | | | | | |
| | 5.0 mm | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | NA | NA | NA | NA | NA | NA |
| VII. | INORGANIC WATER QUALITY | | | | | | | |
| | pH | NA | NA | NA | NA | NA | NA | NA |
| | Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA |
| | TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA |
| | Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = .Not Detected
NA = Not Analyzed
(1) Neither 1,1,1 - nor 1,1,2 - were detected
(2) Totaly Xylenes
(3) Reported as <1 mg/L "Petroleum Hydrocarbons"
(4) Reported as 3.4 mg/L.

TABLE A-17

CHEMICALS IN GROUND WATER - WELL MW17

| | | 10/17/90 | 1/17/91 | 3/31/91 | 8/1/91 | 1/92 | 8/1/92 | 1/29/93 |
|---|---|---|---|---|---|---|---|---|
| I. | PCBs (µg/L) | | | | | | | |
| | Aroclor 1242 | ND 0.47 | ND 0.53 | ND 0.25 | ND 0.5 | NA | NA | NA |
| | Aroclor 1254 | ND 0.47 | ND 0.53 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Aroclor 1260 | ND 0.47 | ND 0.53 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 | ND 0.5 |
| | Total PCBs | ND | ND | NA | NA | NA | NA | NA |
| II. | VOLATILE ORGANIC COMPOUNDS (µg/L) | | | | | | | |
| | Benzene | ND 5 | NA | NA | NA | NA | NA | NA |
| | Tetrachloroethene | ND 5 | NA | NA | NA | NA | NA | NA |
| | Trichloroethane | ND 5(1) | NA | NA | NA | NA | NA | NA |
| | Xylenes | ND 5(2) | NA | NA | NA | NA | NA | NA |
| | Trichloroethene | ND 5 | NA | NA | NA | NA | NA | NA |
| III. | CHLORINATED BENZENES (µg/L) | | | | | | | |
| | 1,2,3,5-Tetrachlorobenzene | ND 10 | NA | NA | ND 0.002 | NA | NA | NA |
| IV. | TOTAL PETROLEUM HYDROCARBONS (µg/L) | ND 1000(3) | NA | NA | NA | NA | NA | NA |
| V. | OTHER ORGANICS (µg/L) | | | | | | | |
| | Butylbenzylphthalate | ND | NA | NA | NA | NA | NA | NA |
| | Diethylphthalate | ND | NA | NA | NA | NA | NA | NA |
| | Total Organic Carbon | 800/1000+(4) | NA | NA | NA | NA | NA | NA |
| | Oil and Grease | NA | NA | NA | NA | NA | NA | NA |
| VI. | METALS (mg/L) | | | | | | | |
| | Lead | | | | | | | |
| | 5.0 mm | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | NA | NA | NA | NA | NA | NA |
| | Zinc | | | | | | | |
| | 5.0 mm | NA | NA | NA | NA | NA | NA | NA |
| | 0.45 mm | NA | NA | NA | NA | NA | NA | NA |
| VII. | INORGANIC WATER QUALITY | | | | | | | |
| | pH | NA | NA | NA | NA | NA | NA | NA |
| | Conductivity (umhos/cm) | NA | NA | NA | NA | NA | NA | NA |
| | TDS (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | TSS (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Chloride (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Nitrate (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Sulfate (mg/L) | NA | NA | NA | NA | NA | NA | NA |
| | Silica (mg/L $SiO_2$) | NA | NA | NA | NA | NA | NA | NA |
| | Alkalinity (mg/L $CaCO_3$) | NA | NA | NA | NA | NA | NA | NA |

Note:
ND = Not Detected
NA = Not Analyzed
(1) Neither 1,1,1 - nor 1,1,2 - were detected
(2) Totaly Xylenes
(3) Reported as <1 mg/L "Petroleum Hydrocarbons"
(4) Reported as $0.8/1.0^{+}$ mg/L.

INVESTIGATIVE AND PROJECT
WASTE MANAGEMENT PLAN

GE-SPOKANE REMEDIAL DESIGN/REMEDIAL ACTION PROJECT

# INVESTIGATIVE AND PROJECT WASTE MANAGEMENT PLAN

Prepared for

GENERAL ELECTRIC COMPANY

by

BECHTEL ENVIRONMENTAL, INC.

San Francisco, California

December 1993

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## TABLE OF CONTENTS (Cont'd)

## Section 1

## INTRODUCTION

This Investigative and Project Waste Management Plan was prepared by Bechtel Environmental, Inc. (Bechtel) for General Electric Company (GE) as one of the Project Plans for the GE-Spokane Remedial Design/Remedial Action (RD/RA) Project, as required under the *Consent Decree (WDOE, 1993b)* between GE and the Washington Department of Ecology (WDOE).

The remainder of Section 1 gives a brief project background, including a description of current conditions at the GE-Spokane site, and discusses the purpose of this plan. Section 2 of this plan describes the activities expected to generate wastes. Section 3 describes the methods of managing the various types of wastes which any generated. Section 4 describes the documentation to be performed during collection, handling, storage, and disposal of both hazardous and non-hazardous wastes. Section 5 provides a list of references cited. Table 1-1 provides a cross-reference indicating where the items required in the Consent Decree are addressed in this plan.

### 1.1 Project Background

GE operated an apparatus service shop at East 4323 Mission Avenue in Spokane, Washington, during the period 1961 to 1980 (see Section 2 of the Summary Cleanup Action Planning Report for more information regarding the service shop). Figure 1-1 shows the project site location and Figure 1-2 shows the site layout, including the former facilities, as existed in 1989. Existing site surface features are shown in Figure 1-3.

In 1985, polychlorinated biphenyls (PCBs) were detected in site soils. GE subsequently performed Phase 1, 2, and 3 investigations of PCBs and other constituents in soil and ground water. More information about these investigations is presented in *Bechtel, 1986a; Bechtel, 1986b; Bechtel, 1987;* and *Golder, 1988.*

In 1989, the site was placed on the National Priorities List (NPL), by the U. S. Environmental Protection Agency (U.S. EPA). Therefore, the site investigations and cleanup are subject to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the Superfund Amendments and Reauthorization Act (SARA). The site is also subject to the State of Washington Model Toxics Control Act (MTCA). The U.S. EPA designated Washington Department of Ecology (WDOE) as the lead regulatory agency for this site.

The area designated as the NPL site includes the GE property and adjacent properties owned by Washington Water Power and Mr. Marvin E. Riley, doing business as Federal Construction Company. Following the change to NPL status, GE entered into an Agreed Order with WDOE. Under the terms of the Agreed Order, GE subsequently performed a two-phase remedial investigation (Phase 4 for soils and other solid materials and Phase 5 for ground water) and a baseline risk assessment (see *Bechtel, 1991a; Everest, 1992;* and *Golder, 1992*).

The remedial investigations indicated that PCBs were present in surface soils, in sediments in sumps and other underground structures, and in soils beneath these structures, including the West Dry Well where steam cleaning effluent was discharged during operation of GE's service shop. Concentrations of PCBs were also detected in ground-water samples collected from wells downgradient of the West Dry Well. Petroleum hydrocarbons, metals and volatile organic compounds (VOCs) were also detected in some soil or ground-water samples. The extent of residual chemicals is described in more detail in Section 2 of the Summary Cleanup Action Planning Report.

During the Phase 4 Remedial Investigation, GE conducted some interim actions, including demolition of the site building and excavation of underground structures and associated soils. These activities are described in the reference *Bechtel, 1991a*.

Since about 1986, GE has been exploring the possible use of in situ vitrification (ISV) for treating the soils containing PCBs at the site. The ISV technology, which is a thermal treatment/immobilization process, is described further in Section 4 of the Soil Treatment Plan. In order to use this technology for treatment of PCB-containing soils at the GE-Spokane site, a Toxic Substances Control Act (TSCA) - required demonstration test must be performed so that the vendor of the technology, Geosafe Corporation (Geosafe), may obtain a TSCA permit for "disposal" of PCBs.

It was planned to conduct the ISV Demonstration Test at the GE-Spokane site in 1991. Shallow soils previously identified as PCB-containing were excavated and placed in five test cells along with soils spiked with imported PCBs and other materials removed during the interim actions described above. The preparations for the ISV Demonstration Test are described more completely in the reference *Bechtel, 1991b*. The planned demonstration test was delayed due to a mishap which occurred during an Operational Acceptance Test of the ISV equipment conducted by Geosafe at its Richland, Washington test site.

Under TSCA, a certificate of disposal must be provided within one year from the date when PCBs are "taken out of service" or removed from their original location. The PCB-spiked soils in one of the ISV test cells are subject to this requirement. The TSCA Section of U.S. EPA Region X was notified that, due to the delay in the planned ISV Demonstration Test, the spiked soils might remain in place for more than one year. U.S. EPA Region X granted an extension of the disposal certification requirement, with the provision that a plan and schedule for properly disposing of the materials "taken out of service" be submitted by October 1, 1993. A temporary cap was placed over the test cells in November 1991 to prevent infiltration of precipitation into the test cells and periodic site maintenance and inspections have been conducted since that time. The current schedule provided by Geosafe indicates the ISV Demonstration Test may be performed in early 1994.

After completion of the remedial investigations, GE conducted a feasibility study to evaluate remedial alternatives for soil and ground water (*Bechtel, 1992*). The feasibility study concluded that in situ vitrification would be the preferred cleanup action for soils, and institutional controls coupled with ground-water monitoring would be the preferred action for ground water. Contingent remedies were also identified in the feasibility study, for implementation in the event that ISV is not successfully demonstrated or ground-water monitoring and institutional controls are found to be ineffective. The contingent remedies are dechlorination for the soils; and extraction, treatment and discharge to a publicly-owned treatment works for the ground water.

In March 1993, WDOE issued a Cleanup Action Plan for the site *(WDOE, 1993a)*. The Cleanup Action Plan specifies PCBs and petroleum hydrocarbons as indicator chemicals for site cleanup and specifies the following cleanup levels:

| Medium | PCBs | Petroleum Hydrocarbons |
|---|---|---|
| Shallow Soils ($\leq$ 15 ft deep) | 10 mg/kg | 200 mg/kg |
| Deep Soils (> 15 ft deep) | 60 mg/kg | 200 mg/kg |
| Ground Water | 0.1 µg/L | not applicable |

The Cleanup Action Plan specifies that the cleanup action for soils is treatment by vitrification and that the cleanup action for ground water is compliance monitoring and institutional controls; which are the preferred remedies identified in the feasibility study. The Cleanup Action Plan also specifies the same contingent remedies identified in the feasibility study. In-situ stabilization of some of the deep soils (grouting of soils below the West Dry Well from about 30 feet below ground surface to about 10 feet into the saturated zone) will also be performed because it is unlikely that the ISV technology will be sufficiently developed for treatment of soils at such depths.

The Consent Decree between GE and WDOE *(WDOE, 1993b)* outlines GE's responsibilities in performing the cleanup, including a specific scope and schedule of activities and deliverables. This document is a required deliverable under the Consent Decree.

### 1.2 Purpose of Plan

During the course of performing field activities associated with ground-water and soil cleanup at the GE-Spokane site, different wastes will be generated including soil, ground water, decontamination fluids, used personal protective equipment (PPE), and disposable sampling equipment. The National Contingency Plan (*U.S. EPA, 1990* and *U.S. EPA 1991*) specifies that management of investigation-derived wastes must attain all applicable or relevant and appropriate requirements (ARARs) to the extent practicable considering the exigencies of the situation. The Model Toxics

Control Act also requires that management of wastes generated during investigations and cleanup actions be addressed.

The purpose of this plan is to describe where and how investigative- and project-derived wastes will be managed to assure protection of human health and the environment during conduct of the work.

## Section 2

## ACTIVITIES EXPECTED TO GENERATE WASTE

This section briefly describes the field activities which are expected to generate investigative- and project-derived wastes. These activities are described in detail in the Soil Treatment Plan, the Ground-Water Monitoring Plan and the Compliance Monitoring Plan.

### 2.1 Installing and Abandoning Monitoring Wells and Quarterly Sampling

Four new monitoring wells will be drilled for ground-water compliance monitoring, as described in the Ground-Water Monitoring Plan. Drilling will be done with an air rotary casing hammer drill rig and a cyclone to separate drill cuttings brought to the surface in the return air stream. Soil samples may also be collected during drilling by driving a split-spoon sampler.

Several onsite and offsite wells will be abandoned. During abandonment of the monitoring wells, the protective surface casings, posts and concrete pads will be removed.

After the new monitoring wells are installed, the wells will be developed prior to sampling the ground water. The wells will be developed by pumping and surging to remove sediment. Prior to sampling, each well will be purged to ensure that a representative sample of formation water is collected. During and after the drilling and sampling activities, equipment will be decontaminated.

These activities will generate wastes in the form of drill cuttings; PVC, and steel casings; drill cuttings; well development and purge waters; used PPE, disposable equipment and cleaning fluids.

## 2.2 Modifying ISV Test Cells

Prior to conducting the in situ vitrification (ISV) Demonstration Test at the GE-Spokane site, the five engineered test cells will need to be modified. (The planned test cell modifications are described in Section 5.1 of the Soil Treatment Plan.)

Modification of the ISV test cells will consist of: 1) rupturing each of the seventy-eight 55-gallon soil filled, sealed drums at the bottom of four test cells by vibratory driving a steel I-beam through each drum; 2) making vertical openings in four of the test cell panel walls by vibratory driving or pile driving; 3) removing two feet of PCB-containing soil from the top of the test cells to reduce the ISV melt depth; and 4) creating a clean sand zone outside the north wall of test cell number 2. The test cell area will be recovered with plastic sheeting overlain by clean gravel ballast after the modifications.

These activities will result in the contact of equipment and materials with PCB-containing soils. Equipment decontamination will result in the generation of cleaning fluids. Used PPE and disposable equipment items will also be generated.

## 2.3 Conducting ISV Demonstration Test

The ISV Demonstration Test is described in detail in the Soil Treatment Plan. Briefly, the ISV Demonstration Test will consist of vitrifying the five modified test cells at the GE-Spokane site. The expected site configuration during the demonstration test is shown in Figure 2-1.

The primary equipment items for the demonstration test will include the off-gas process trailer, the electrical-trailer, and the support trailer. Associated equipment not shown on Figure 2-1 will include the moveable ISV hood, a crane for moving the hood from setting to setting, and a front-end loader and a grader to backfill subsidence zones after the melts are completed. In general, the ISV equipment does not contact chemical-containing materials except for the electrodes and the internal surfaces the off-gas treatment system.

Spent scrubber solution from the off-gas treatment system and small quantities of disposable equipment and used PPE waste from Geosafe's operations during the first four melt settings will be incorporated into the fifth melt setting. However, small quantities of these wastes generated during the fifth melt setting will require management. Other wastes will include carbon electrode sections which are no longer useable.

## 2.4 Excavating and Staging Soils for Treatment

During the early portion of the soil cleanup, clean soils overlying chemical-containing soils will be excavated and temporarily stockpiled onsite for later use as clean backfill. Removal of these soils will be accomplished with equipment such as a front-end loader, a scraper, and a backhoe. Shoring may be needed in the West Dry Well area excavation, which will be 30 feet deep. Clean soils stored in stockpiles will be covered to minimize wind-blown dust.

In preparation for conducting soil treatment, chemical-containing soils will be excavated, using similar equipment as above, from the locations shown in Figure 2-2. Portions of the excavated soil may be temporarily stockpiled on plastic sheeting and covered prior to staging for treatment. While the excavations are open, it is possible that rainfall could enter the excavations and contact soils containing chemicals. Management of surface runoff is discussed in Section 3.4.

Soils in areas to be used for the vitrification cells will also be excavated. These soils, which are expected to be clean, will also be stockpiled and covered with plastic sheeting for eventual use as clean backfill. Chemical-containing soils from the temporary stockpile(s) will then be mechanically screened and the resulting fines placed by front-end loader or by crane and buckets into the vitrification cells and covered with clean soil. If water is used in the screening operation or in washing chemical-containing cobble, then these fluids will be collected and managed similarly to decontamination fluids.

These activities are expected to generate project wastes of several types: clean plastic and other clean materials, plastic sheeting and other materials with adhering soils potentially containing chemicals, used disposable equipment and PPE, cleaning fluids, and sampling-related wastes. It is possible that storm runoff potentially containing chemicals could be generated during rainfall events.

## 2.5 Grouting of West Dry Well

Grouting of the West Dry Well is described in Section 4.1 of the Soil Treatment Plan. Briefly, soils in the West Dry Well area will be grouted from about 30 feet below ground surface to approximately 10 feet into the saturated zone. A drill rig will be used to accomplish this by injecting a mixture of cementitious materials and water. This activity is expected to occur prior to the excavation and staging of soils for treatment by vitrification.

This activity is expected to generate project wastes of these types: drill cuttings, waste, soil/cement mixture, left-over non-hazardous materials used in the grouting process, plastic sheeting used to contain drips and spills of grout mix, fluids from cleaning of the grouting equipment, and personal protective equipment and consumables used during the activities which will require management onsite and perhaps offsite disposal.

## 2.6 Soil, Soil-Gas, and Air Compliance Monitoring

Compliance monitoring activities will include the collection of soil, soil-gas and air samples, as described in the Compliance Monitoring Plan. Soil sampling activities will take place during the following activities: drilling of the new ground-water monitoring wells, excavation of soils, volume reduction, grouting the West Dry Well area, soil vitrification, and backfilling.

These soil sampling activities are expected to involve the operation of drilling rigs, the use of split-barrel samplers, the use of hand sampling equipment and the cleaning of equipment and materials.

During the ISV Demonstration Test, soil-gas pressures will be monitored in three soil-gas wells around the perimeter of the test cells. After completion of the monitoring, the soil-gas wells will be abandoned. Soil-gas and air sampling may generate small amounts of sampling wastes.

The types of wastes expected to be generated during these sampling activities are soil cuttings, residual samples in sample containers, plastic sheeting used for laydown of equipment and materials, cleaning fluids, disposable sampling equipment and materials such as tubing and filters, waste PVC casing from the soil-gas wells and used PPE.

## 2.7 Soil Treatment

Soil treatment by vitrification will occur after staging of chemical-containing soils in the vitrification cells as indicated in Figure 2-3. Vitrification will be accomplished in a series of melt settings, using the same equipment that will have been used during the ISV Demonstration Test.

Wastes expected to be generated during soil treatment by vitrification are carbon electrode sections that are no longer usable, spent scrubber solution, a minor amount of fluids (from cleaning equipment and air sampling trains after completion of the melts) and used personal protective equipment.

## 2.8 Onsite Analysis

An onsite analytical laboratory will be used during compliance monitoring for soil cleanup. Analyses of soil samples will be performed for PCBs and total petroleum hydrocarbons. Waste expected to be generated from onsite analysis are spent extraction chemicals, residual samples and sample containers, sampling-related cleaning fluids, disposable sampling/analysis equipment, and used PPE.

## Section 3

## MANAGEMENT OF INVESTIGATIVE AND PROJECT-DERIVED WASTES

This section describes the procedures for management of the various types of wastes expected to be generated during the RD/RA field activities at the GE-Spokane site. Management includes collection, temporary storage, containment, treatment, transport, disposal, and documentation. Table 3-1 presents a waste management matrix for the various waste types which summarizes how each will be managed. The remaining subsections describe the procedures in more detail, including anticipated locations on site where the various wastes will be managed.

### 3.1 Drill Cuttings

Drill cuttings will be collected in Department of Transportation (DOT) type 17H drums during drilling the monitoring wells. Each drum will be marked with the date of collection, the borehole number, and the appropriate depth interval of the boring. Soil samples taken for geologic logging will also be placed in the appropriate drum.

Drums of cuttings will be taken from the boring location, onsite or offsite, and brought to a temporary storage area located on the eastern portion of the GE property as indicated in Figure 2-1. The GE property is securely fenced and gates will be kept locked when the site is unoccupied.

If samples were not collected and analyzed during drilling, drill cuttings will be tested for indicator chemicals. One sample will be collected from each drum and the samples from each borehole will be composited and analyzed for indicator chemicals. If the cuttings do not contain chemicals above cleanup levels, then, wherever feasible, these drill cuttings will be placed in a clean backfill stockpile for use as subsurface backfill on the site. If indicator chemicals are present above cleanup levels, the cuttings will be staged in the vitrification cells for treatment. If that is not feasible, the drum(s) of cuttings will be transported offsite by a licensed hazardous waste transporter for disposal at the TSCA-permitted disposal facility at Arlington, Oregon.

Empty drums will be washed with detergent solution, rinsed and then steam cleaned. The drums will either be reused onsite or sent offsite for salvage as scrap metal. Drums sent offsite will be rendered unusable.

## 3.2 Well Development and Purge Water

New monitoring wells will be developed after installation. The development water will be collected in 55-gallon DOT 17 E drums or polyethylene tanks and temporarily stored on site. A sample of development water from each well location will be tested for the presence of indicator chemicals.

Well purge water generated during the quarterly sampling of the monitoring wells will also be collected in DOT 17 E drums or polyethylene tanks and stored onsite until the ground-water sample analytical results are available.

The drums of development or purge water will be stored on the eastern portion of the GE property in a visqueen-lined area surrounded by an earthen berm for containment in the event of spillage or leakage. The anticipated storage location is shown in Figure 2-1.

If the development or purge water is found to contain chemicals at levels of concern, the water will either be treated by powdered activated carbon or will be pumped through a portable granular activated carbon unit and re-analyzed. If clean, water will be discharged to an infiltration pit onsite or will be used for dust control (if there is a need). Powdered carbon, if used, will be collected in an open container and the residual water will be allowed to evaporate. The dried carbon will either be staged in the soil treatment area for vitrification or appropriately containerized for transport to a TSCA-permitted disposal facility. If granular carbon is used, the spent carbon will be sent offsite for thermal regeneration.

### 3.3 Soil and Debris

Soil and debris waste of three types will be generated during field activities on site: 1) waste known to be clean, 2) waste potentially containing chemicals, and 3) TSCA-regulated soil removed from the ISV test cells. Clean soil and debris waste, such as clean soil, cobbles or fill excavated to get access to soil containing chemicals, will be temporarily stored in clean areas of the site until the material can be used as clean backfill in excavation areas. No special waste management precautions will be taken other than to prevent mixing of such materials with soils containing chemicals and to prevent windblown dust by wetting or covering.

Soil and debris known or suspected to contain chemicals will be handled by conventional earth-moving equipment and will be temporarily stockpiled in visqueen-lined areas of the site. When not in use, stockpiled soil will also be covered with visqueen and anchored to minimize wind-blown dust. The stockpile areas will be surrounded with earthen berms to prevent runoff.

When appropriate, stockpiled soil and debris will be staged in the vitrification cells for treatment. It is not anticipated that any soil and debris containing chemicals above cleanup levels will be transported offsite for disposal except for the TSCA-regulated soil to be removed during modification of the ISV test cells.

### 3.4 Storm Runoff

The soil treatment design documents will include provisions for managing stormwater on the site during soil cleanup. In the event that storm runoff comes in contact with soils potentially containing chemicals, such as in excavations, the collected runoff will be pumped into polyethylene tanks or 55-gallon drums for testing and, if necessary, treatment before disposal. The containers will be placed in the drum storage area until analytical results are available. Containerized runoff will be managed similarly to development and purge waters and cleaning fluids.

## 3.5 Electrodes, Casings, Drums, and Temporary Construction Materials

A variety of non-native materials will be used onsite during the field activities and will become excess materials or wastes at the completion of these activities. Such materials will include temporary construction materials (framing wood, drum pallets, steel and wood structural members); vitrification electrode sections; PVC casings from the ISV Demonstration Test cells; PVC, stainless steel, and steel casings from abandoned monitoring wells; steel drums used to contain soil cuttings, development water, and cleaning fluids; and other materials and equipment required to perform the investigative and cleanup work. These types of materials may come into contact with soils or ground water containing chemicals.

Many other materials brought to the site will not be used in areas where chemical-containing soils are present and therefore will be managed in accordance with normal practices at a construction site. Such materials would include cardboard boxes, packing materials, plastic and aluminum containers, office trailer refuse, and others. A covered debris box will be maintained in a clean area of the site to contain used materials of these types. When practical, materials will be recycled, otherwise they will be sent to a municipal landfill for disposal.

Materials that have, or may have, come into contact with chemicals will be temporarily stored on visqueen in clean areas of the site (which will be securely fenced). Prior to removal from the site, adhering soil will be physically removed by brushing or blowing with compressed air, then steam cleaning. The ISV electrode casings, and the PVC and steel casings from monitoring well abandonment will be rendered unusable before landfill disposal or salvage as scrap metal. Empty drums which contained soil and ground water will be washed with detergent solution and rinsed prior to steam cleaning. Clean materials, such as the electrode sections, will be shipped offsite for recycling or salvage, if feasible. Empty drums shipped offsite will be rendered unusable. The other clean, but non-recyclable materials will be transported to a local municipal landfill for disposal.

## 3.6 ISV Scrubber Solution

Spent scrubber solution from the ISV off-gas treatment system will generally be pumped into DOT 17 E drums and taken to the vitrification cells and mixed with soils for subsequent vitrification. Spent scrubber solution from the final melt (the last melt occurring prior to demobilization of the vitrification equipment) will be collected in DOT 17 E drums, neutralized, then sampled and analyzed for waste profiling. If the solution is hazardous, the drums of spent solution will be shipped offsite, under manifest, to a TSCA-permitted facility for treatment and disposal. If the solution is not hazardous but contains low concentrations of regulated chemicals such as PCBs, it may be treated by mixing with powdered activated carbon or by pumping it through a portable carbon unit. Then the treated solution would be re-analyzed. If chemicals are not detected above levels of concern, the treated solution would be discharged to an onsite infiltration pit. The carbon would be handled as described previously in Section 3.2.

## 3.7 Residual Samples and Analytical Waste

Sample residuals left-over after collection and onsite laboratory analysis either will be mixed with soils in the vitrification cells for treatment (preferable) or will be placed in lab packs for offsite transport and disposal in a TSCA/RCRA-permitted disposal facility.

Spent laboratory chemicals will be stored in a segregated, secure area inside the laboratory trailer until ready for disposal. Samples and sample residuals will be stored in refrigerators onsite near the onsite laboratory and office trailers in a secure area of the site. Small quantities of spent solvents, such as hexane, will be allowed to evaporate from open containers in the drum storage area in the eastern portion of the GE site or in another occupied, secure area on site. If larger quantities of spent laboratory chemicals need to be disposed of, each chemical (or compatible chemicals) will be packaged by the onsite laboratory subcontractor for offsite transport in accordance with DOT packaging, labeling and shipping regulations.

Sample residuals from offsite laboratory analysis will be managed by the offsite laboratory subcontractor(s). These residuals will be packaged, labeled and shipped in accordance with standard laboratory procedures and applicable regulations.

## 3.8 Decontamination Fluids, Disposable Equipment and Personal Protective Equipment

Fluids will be generated during cleaning of reusable equipment and materials that have or may have come into contact with chemical-containing soil or ground water at the site. Fluids may also be generated if water is used during mechanical screening of chemical-containing soils or if water is used in washing chemical-containing cobble from the screening operation. These cleaning fluids will be collected in 55-gallon DOT 17 E drums or poly tanks and temporarily stored onsite in the drum storage area until samples of the fluids have been tested for the presence of chemicals. The drums will be marked with the date of collection. If chemicals are not found at levels of concern, the fluids will be used onsite for dust control or will be discharged into an onsite infiltration pit. If chemicals are detected at levels of concern in these fluids, the fluids will be treated with powdered activated carbon in the drums or by pumping the fluids through a portable carbon treatment unit and retested before disposal. If carbon is not effective in treating these fluids, discharge to the City of Spokane publicly-owned treatment works under permit may be considered as an alternative to shipment to a TSCA/RCRA-permitted facility.

Disposable equipment and materials and used personal protective equipment which may have come into contact with soils or ground water containing chemicals will be generally containerized in 55-gallon DOT 17 H drums during activities where more than 100 kilograms of such waste are expected to be generated. It is unlikely that disposable equipment or used PPE will contain chemicals in concentrations or quantities that would be regulated under TSCA or State of Washington (Dangerous Waste) regulations, especially if efforts are made to remove loosely adhering soil by brushing, shaking or other simple physical cleaning methods. During field events where small quantities of disposable equipment and PPE wastes will be generated, these wastes may be collected in refuse-type plastic bags, then double-bagged and placed in a debris box for disposal in a municipal landfill (Subtitle D facility). Such equipment or materials will be rendered unusable before bagging for disposal.

When larger quantities of disposable equipment and used PPE waste, including visqueen used for lining laydown or stockpile areas, are expected to be generated, these wastes will be temporarily accumulated in labeled drums in the drum storage area. When practical, these wastes will be incorporated with the soil and debris to be vitrified during the ISV Demonstration Test and during soil treatment.

At the conclusion of the soil treatment and the general site cleanup, there may be significant quantities of residual disposable equipment, PPE, and used visqueen-type wastes requiring disposal. These residual wastes will be containerized in DOT 17 H drums (or a roll-off box) for transport offsite, under manifest, to a TSCA-permitted disposal facility as PCB-containing, non-TSCA regulated waste. The remaining, empty, clean drums will be managed as described previously in Section 3.5.

## Section 4

## DOCUMENTATION OF WASTE MANAGEMENT PRACTICES

Because of the many types of activities (and their duration and timing) that will generate investigative-and project-derived wastes, recording information in field logbooks will be the primary means of documenting waste management practices in the field. The Site Construction Manager will be responsible for keeping the daily field logbook(s), documenting site activities relevant to waste generation, and recording waste management information, including:

- Activity generating waste and location (e.g., boring number and location) onsite or offsite;
- Date, quantity and type of waste generated and how collected;
- Description of the waste containers and how labeled (if applicable);
- Description of the temporary storage area and location, including containment and security features;
- Description of any samples of waste taken, time and date of collection, sample designations and other relevant sample information as defined in the Compliance Monitoring Plan;
- Description of any subsequent onsite treatment, re-emplacement and/or reuse or disposal, including relevant dates, quantities, locations and rationale for the actions taken; and
- Listing of other relevant documents (e.g., sample analytical results), pertaining to the waste that will ensure management of the waste is in compliance with this plan.

In addition, a separate waste management field logbook will be kept for waste materials entering and exiting the temporary drum storage area on the eastern portion of the GE property during implementation of soil cleanup at the GE-Spokane site. This logbook is intended to be an inventory control (and checking) document during the peak field activity at the site and will be used to record all information relevant to temporarily storing, labeling, analyzing, profiling, packaging, manifesting, transporting, and disposing of wastes offsite through completion of the soil cleanup activities in 1995. This logbook and supporting documents (copies of analytical results, approved waste profiles, manifests, certificates of disposal, etc.) will be maintained in the project files and will be appended to the Cleanup Action Report (see the Soil Treatment Plan).

## Section 5

## REFERENCES


Bechtel National, Inc., 1986a, *Phase 1 Field Investigation, East 4323 Mission Avenue, Spokane, Washington:* Report to General Electric Company.

Bechtel National, Inc., 1986b, *Field Investigation Report, North Warehouse, Spokane, Washington:* Report to General Electric Company.

Bechtel National, Inc., 1987, *Phase 2 Field Investigation, East 4323 Mission Avenue, Spokane, Washington:* Report to General Electric Company.

Bechtel Environmental Inc., 1991a, *Report of Phase 4 Remedial Investigation and Interim Actions at the former General Electric Spokane Facility:* Report to General Electric Company.

Bechtel Environmental, Inc., 1991b, *Report of In Situ Vitrification Demonstration Test Preparation Activities at the former General Electric Spokane Facility:* Report to General Electric Company.

Bechtel Environmental, Inc., 1992, *Feasibility Study Report for the former General Electric Facility, Spokane Washington:* Report to General Electric Company.

Everest Consulting Associates, 1992, *Baseline Risk Assessment: Mission Avenue Site:* Report to General Electric Company.

Golder Associates, Inc., 1988, *Phase 3 Remedial Investigation, East 4323 Mission Avenue, Spokane, Washington:* Report to General Electric Company.

Golder Associates, Inc., 1992, *Phase 5 Remedial Investigation, East 4323 Mission Avenue, Spokane, Washington:* Report to General Electric Company.

U. S. Environmental Protection Agency, 1990, 40 CFR 300 - *National Oil and Hazardous Substances Pollution Contingency Plan;* Final Rule: Federal Register (Thursday, March 8, 1990).

U. S. Environmental Protection Agency, 1991, *Management of Investigation - Derived Wastes During [SIC] Site Inspections;* Advance Copy: Office of Emergency and Remedial Response (OERR) Directive 9345.3-02 (May 1991).

Washington Department of Ecology, 1990, ***The Model Toxics Control Act Cleanup Regulation and Proposed Amendments:*** Chapter 173-340, Washington Administrative Code (July 27, 1990).

Washington Department of Ecology, 1993a, ***Final Cleanup Action Plan for the General Electric Spokane Site***, March 29, 1993.

Washington Department of Ecology, 1993b, *GE/Spokane Consent Decree*, October 4, 1993.

TABLES

# TABLES

## TABLE 1-1

## CROSS-REFERENCE TO CONSENT DECREE REQUIREMENTS

| *CONSENT DECREE REQUIREMENT* | *Section* |
|---|---|
| Methods and proposed storage/staging locations of materials awaiting treatment. | 3.1 - 3.5, Table 3-1 |
| Well purge water handling, sampling, analysis, and disposal. | 3.2, Table 3-1 |
| Storage, handling, sampling, analysis and disposal of soils generated by investigations. | 3.1, 3.6, Table 3-1 |
| Storage, handling, and disposal of materials generated by or incidental to RAs. | 3.3-3.5, 3.7, Table 3-1 |

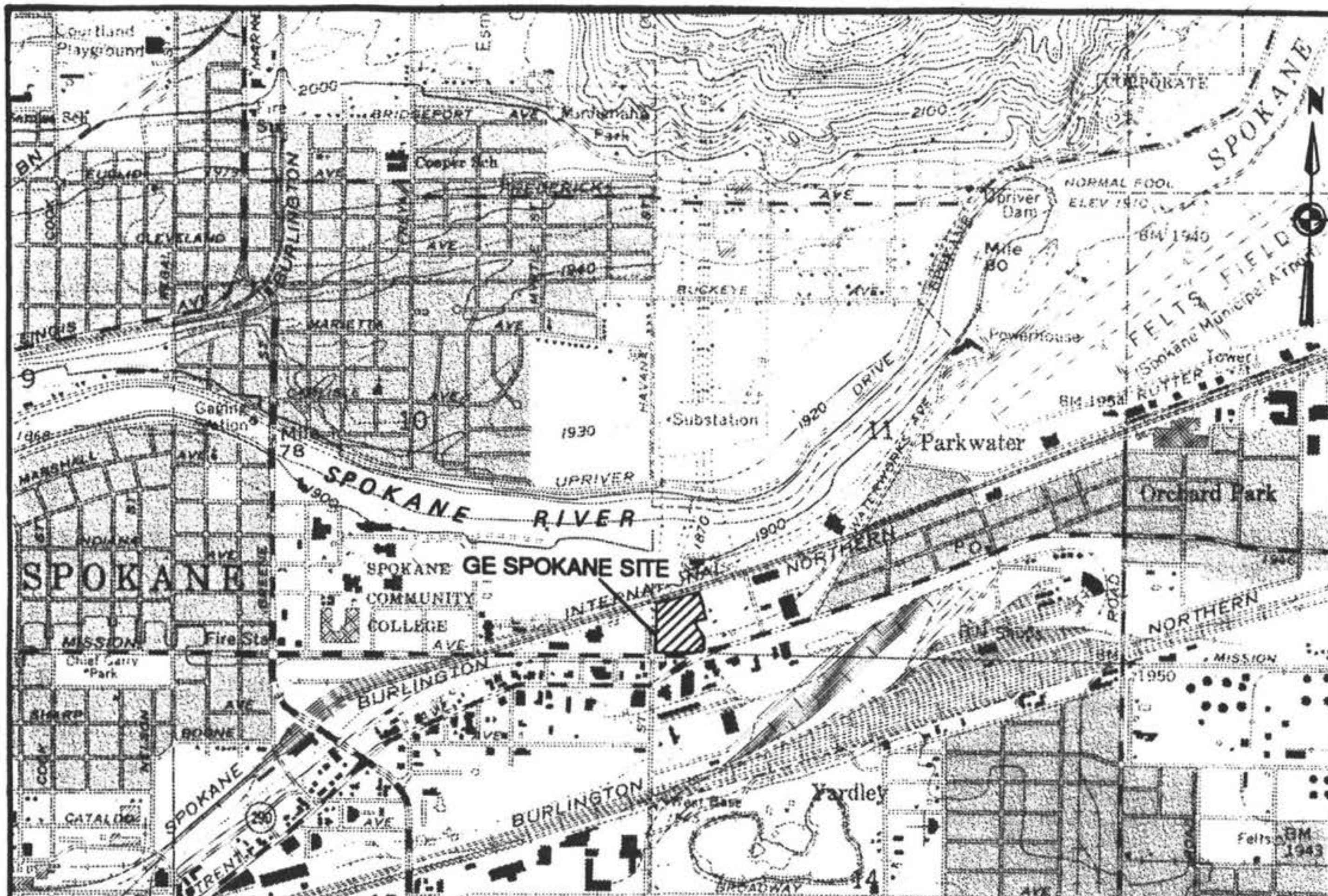
TABLE 3-1

WASTE MANAGEMENT MATRIX

| *Waste Type (Section 4)* | *Collection* | *Temporary Storage* | *Containment* | *Treatment Onsite [Includes Decon]* | *Transport* | *Disposal [If Necessary]* |
|---|---|---|---|---|---|---|
| 1. Drill cuttings from well borings and confirmation sample borings. | Collect in 55-gallon drums; each drum dated and marked with boring number and depth interval. | Store on eastern portion of GE property. | Secure fenced area of site. | Sample/test for chemicals of concern, if levels of concern found, stage in soil treatment area for vitrification or transport offsite to TSCA/RCRA-permitted facility; if clean, stockpile and use as subsurface backfill. | If necessary, transport drums offsite under manifest by licensed hazardous/dangerous waste transporter; label drums in accordance with TSCA/state regulations. | Dispose at TSCA/RCRA-permitted disposal facility at Arlington, OR. |
| 2. Well development/purge water from MW installation and quarterly sampling. | Collect in 55-gallon drum (or poly tanks); date and mark each drum with boring number. | Store on eastern portion of GE property. | Visqueen-lined and bermed area; securely fenced. | Sample/test for chemicals of concern, if positive, treat with powdered activated carbon (PAC) or granular activated carbon (GAC) and retest. | If necessary, transport drums offsite under manifest by licensed hazardous/dangerous waste transporter; label drums in accordance with TSCA/State regulation. | If no chemicals above levels of concern, use for dust control or discharge to an onsite infiltration pit. |
| 3. Soil and debris:<br>a) Clean<br>b) Known or potentially containing chemicals above cleanup levels.<br>c) TSCA-regulated soil from ISV test cells | a) Conventional earth-moving equipment (e.g., backhoe, dump truck).<br>b) Conventional earth-moving equipment (e.g., backhoe, dump truck).<br>c) Conventional earth-moving equipment. | a) Temporarily store in clean area of site.<br>b) Temporarily store in designated stockpile areas on site.<br>c) Temporarily store in designated stockpile areas on site. | a) Temporarily store in clean area of site; cover to prevent wind-blown dust.<br>b) Visqueen-lined and bermed areas; cover to minimize dust, erosion and surface water runoff.<br>c) Visqueen-lined and bermed areas; cover to minimize dust, erosion and surface water runoff. | a) Not applicable.<br>b) Stage for treatment by vitrification.<br>c) Not applicable. | a) Haul by State of Washington licensed transporter, if applicable.<br>b) Not applicable.<br>c) Haul by State of Washington licensed transporter. | a) Use for clean fill onsite or dispose in municipal landfill.<br>b) Not applicable.<br>c) Dispose of at TSCA/RCRA-permitted disposal facility at Arlington, Oregon. |
| 4. Stormwater runoff. | Collect in poly tank #3 or 55-gallon drums. | Store on eastern portion of GE property. | Visqueen-lined and bermed area; securely fenced. | Sample/test for chemicals of concern, if positive, treat with PAC or GAC and retest. | If necessary, transport drums offsite under manifest by licensed hazardous/dangerous waste transporter; label drums in accordance with TSCA/State regulation. | If no chemicals above levels of concern, use for dust control or discharge to an onsite infiltration pit. |
| 5. Electrodes, casings, drums and other construction-related materials (may have come in contact with chemical containing materials). | Not applicable. | Temporarily store in clean areas of site. | Store on visqueen-lined areas of site, securely fenced. | Physically remove adhering soil and steam clean, render casings and containers unusable. | Haul by State of Washington licensed transporter, if necessary. | Recycle if feasible; otherwise scrap metal salvage or dispose in municipal landfill. |
| 6. ISV scrubber solution. | Pump into poly tanks or 55-gallon drums. | Store on eastern portion of GE property. | Visqueen-lined and bermed area; securely fenced. | Mix with soil in treatment cells and vitrify; otherwise, neutralize and treat with carbon, retest for onsite disposal or offsite treatment/disposal. | If necessary, transport drums offsite under manifest by licensed hazardous/dangerous waste transporter for offsite treatment/disposal. | Treat at TSCA/RCRA-permitted facility (incineration or stabilization). |
| 7. Residual samples, spent lab chemicals:<br>a) Onsite,<br>b) Offsite. | a) Collect in appropriate sample/storage containers.<br>b) Collect in appropriate sample/storage containers. | a) Store in refrigerator or chemical storage area in onsite lab.<br>b) Store in accordance with approved procedures. | a) Securely fenced area onsite.<br>b) Containment/security in accordance with approved procedures. | a) Mix with soil in treatment cells and vitrify; otherwise place in lab packs and label for offsite disposal.<br>b) Place in lab packs and label. | a) If necessary, transport lab packs under manifest by licensed hazardous waste transporter.<br>b) Transport under manifest by licensed hazardous waste transporter. | a) TSCA/RCRA-permitted disposal facility.<br>b) TSCA/RCRA-permitted disposal facility. |
| 8. Decontamination fluids, wash waters, disposable equipment, and used personal protective equipment. | Collect in 55-gallon drums or poly tanks in washing/decontamination area(s). | Store on eastern portion of GE property. | Visqueen-lined and bermed area; securely fenced. | Sample/test fluids. If positive, treat with PAC or GAC and retest. Place equipment and used PPE in soil treatment cells for vitrification; otherwise retain for offsite disposal. | If necessary, transport drums under manifest by licensed hazardous/dangerous waste transporter. | If no chemicals above levels of concern, use fluids for dust control or discharge to an onsite infiltration pit. |

FIGURES

FIGURES

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SCALE IN FEET

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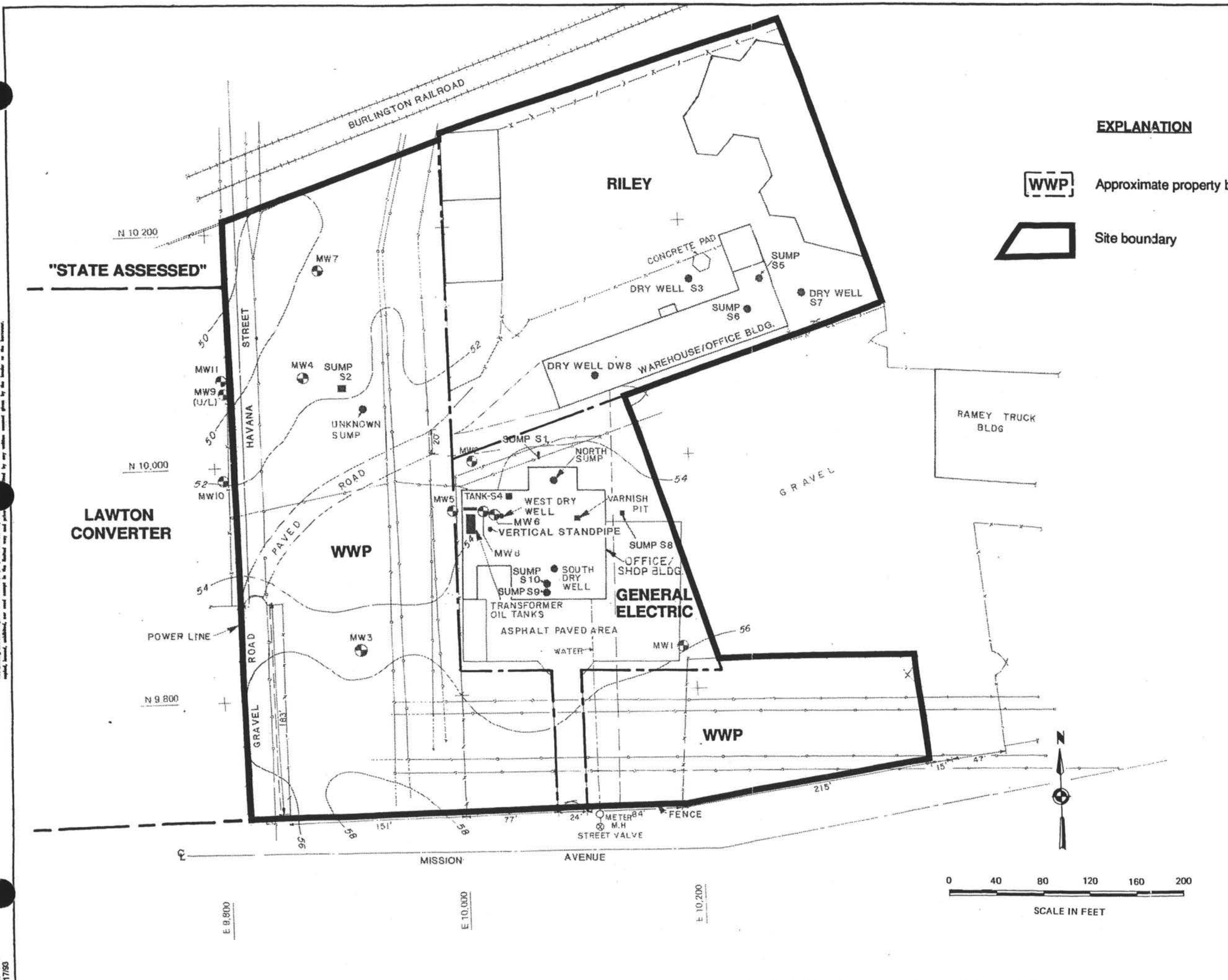
GENERAL ELECTRIC/SPOKANE

**SITE LOCATION MAP**

| Job Number | Drawing No. |
|---|---|
| 19099 | FIGURE 1-1 |

IPWMP-001-A
5/11/93

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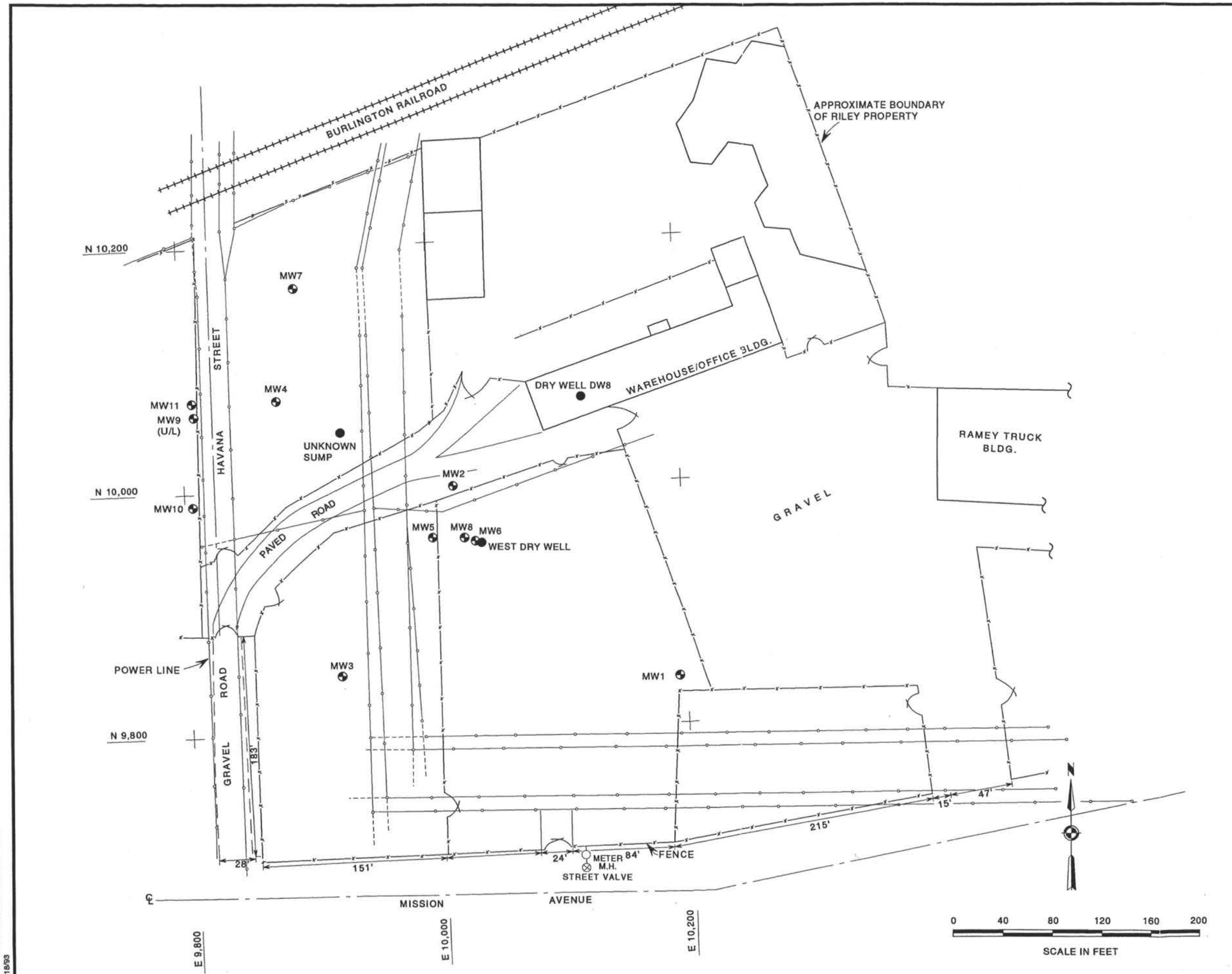
**SITE OWNERSHIP AND FORMER FACILITIES**

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 1-2 | B |

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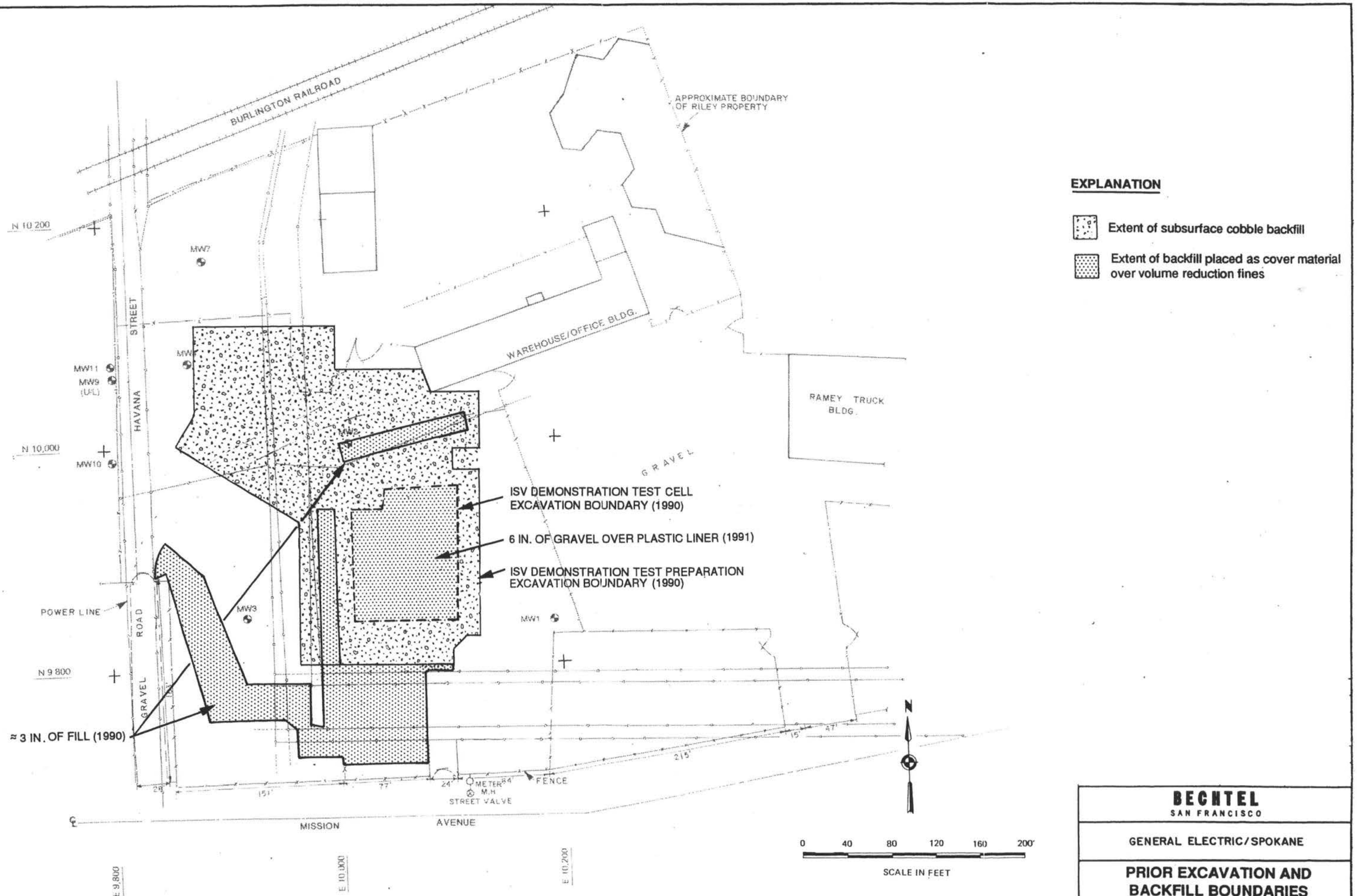
## EXISTING SITE FEATURES

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 1-3 | A |

GESP005de/RD_RA WP/STP/STP-017-A
8/18/93

SIZE D

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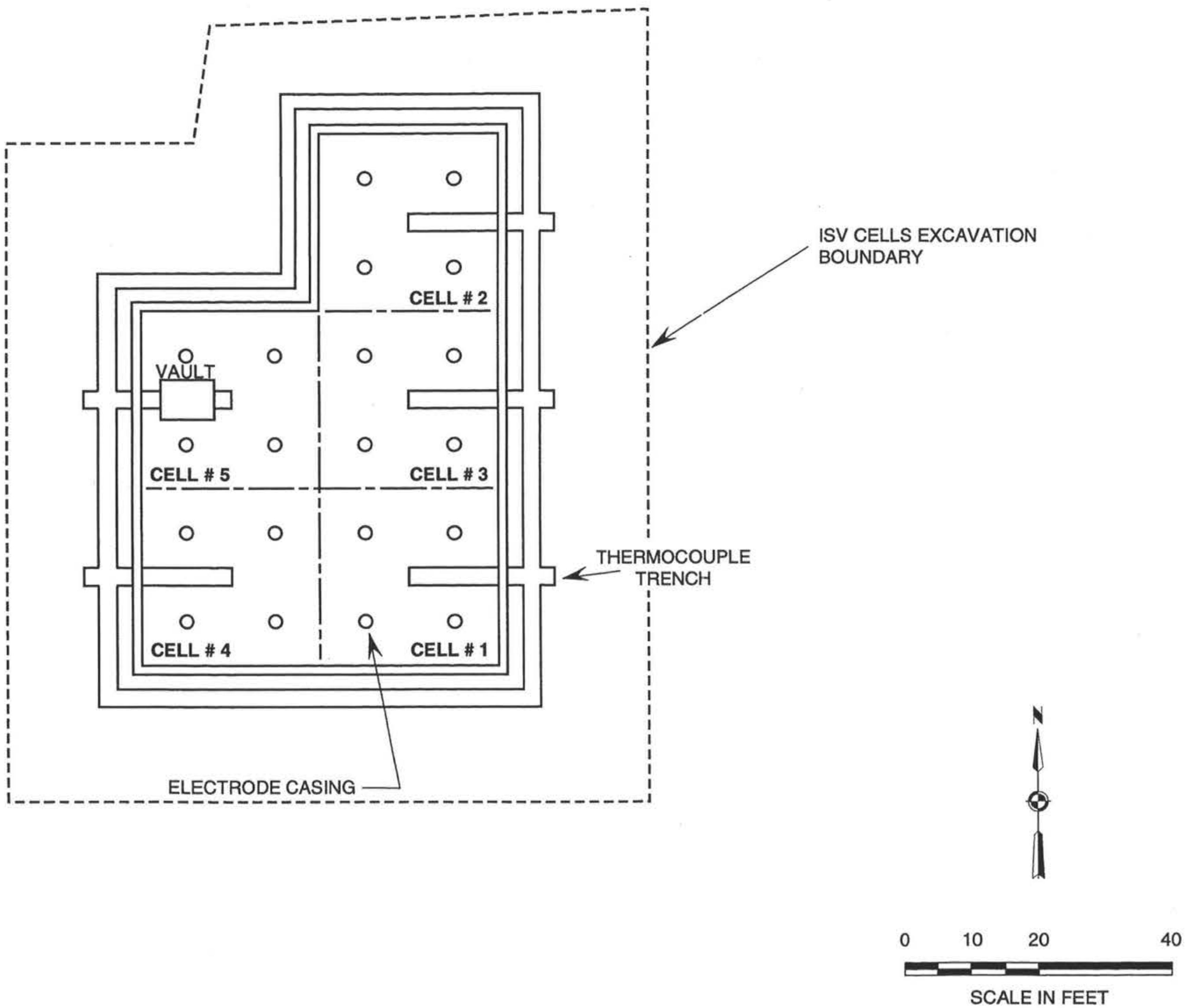
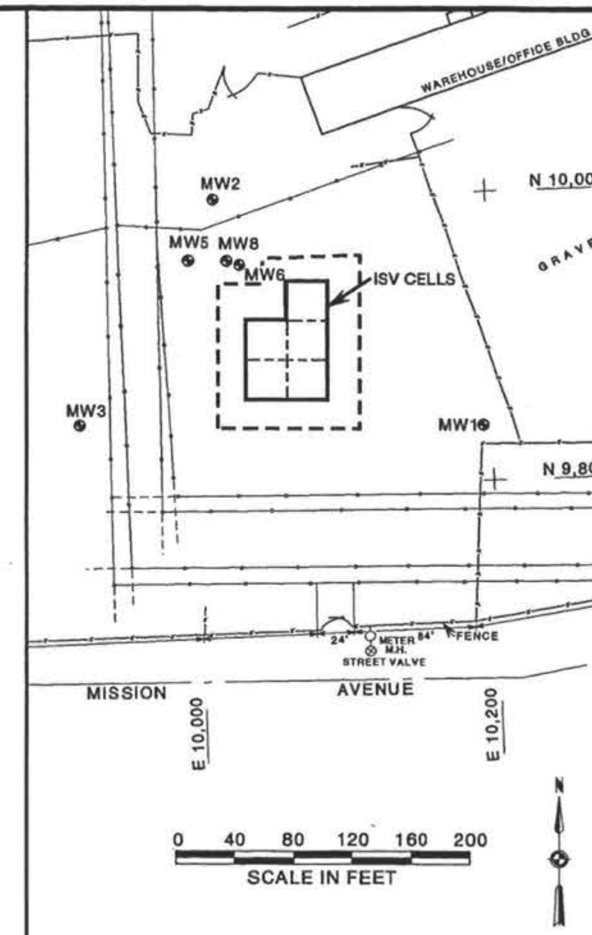
**PRIOR EXCAVATION AND BACKFILL BOUNDARIES**

| JOB No. | DRAWING No. | REV. |
|---|---|---|
| 19099 | FIGURE 2-1 | C |

STP-007-C
9/16/93




KEY PLAN

**NOTES:**

1) A schematic profile through the test cells is shown in Figure 2-3.

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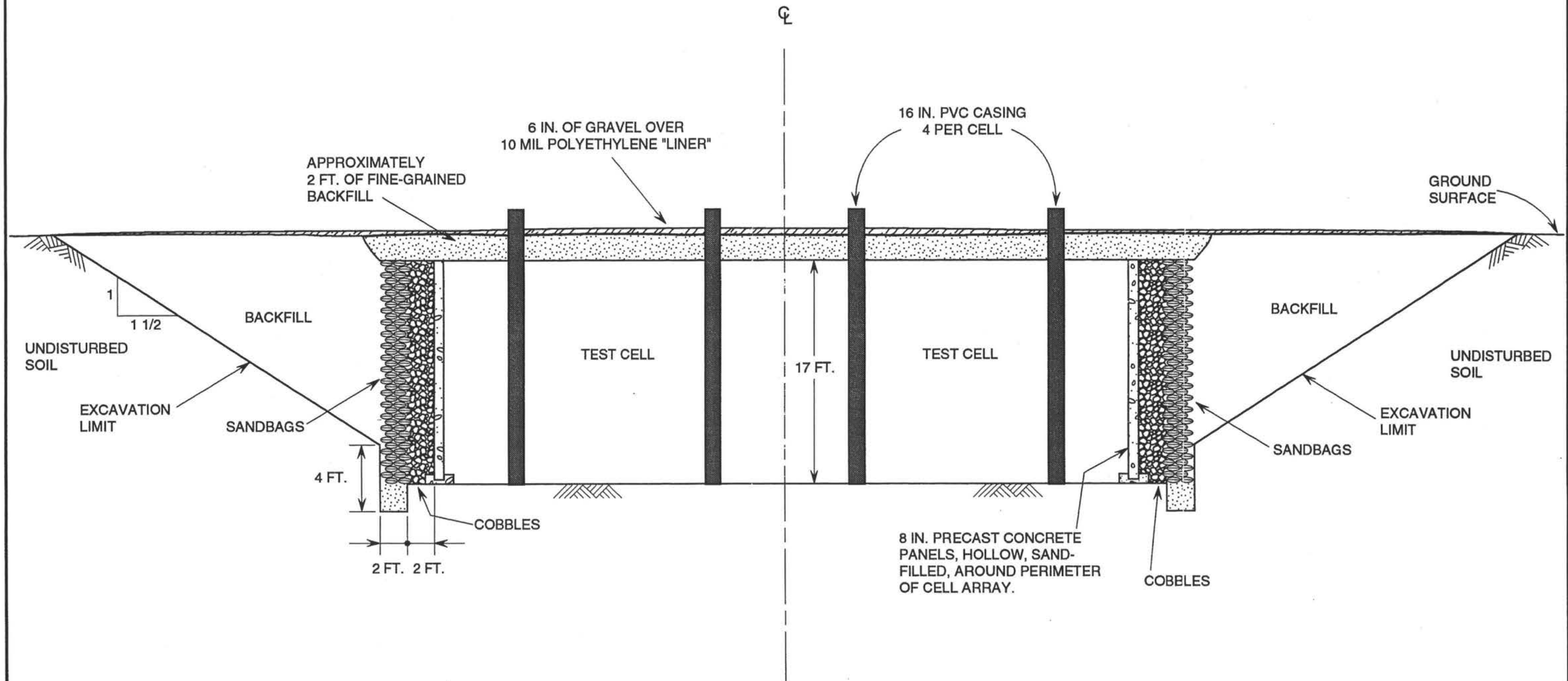
**PLAN VIEW OF THE ISV TEST CELLS**

| Job Number | Drawing No. | Rev. |
|---|---|---|
| 19099 | FIGURE 2-2 | B |

GESP009da/RD_RA WP/STP/STP-003-B
9/14/93da




| | | |
|---|---|---|
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| GENERAL ELECTRIC/SPOKANE | | |
| **PROFILE OF THE ISV TEST CELLS** | | |
| Job Number | Drawing No. | Rev. |
| 19099 | FIGURE 2-3 | D |

GESP015da/RD_RA WP/STP/STP-004-D
10/13/93